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GOT A DIY QUESTION?

Finding answers is easy at familyhandyman.com. Just use the search box at the top of the page to get expert step-by-step help with your project. Or register on the site and join our DIY Forum, where you can ask questions or give advice.

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We pay a $100 gift card for Handy Hints® and Great Goofs® submissions that we publish. Please include a photo of yourself from the shoulders up. Submit your original contribution, along with photos or sketches, by e-mail to:

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greatgoofs@thefamilyhandyman.com

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STUFF we love

BY TRAVIS LARSON editors@thefamilyhandyman.com

POWER WASHER WONDER

Any pressure washer can clean a hard surface like concrete, but it takes forever, and if you move the nozzle too fast or too slow, you wind up with streaks and striping. That's why we were blown away by the results from this whirlybird-style surface cleaner from Briggs & Stratton (No. 6178; $60 at home centers and pressure washer stores). We snapped it onto the end of our power washer and put it to work cleaning dirty concrete.

As soon as you pull the trigger, the cleaner lifts off the surface and floats like a hovercraft. We just pushed it along at a steady pace and let it do its job. The spinning jets blasted a clean, uniform 14-in.-wide swath, and the brush skirt prevented damage to the grass edging, flower beds and walls. We cleaned the entire walk and patio in less than half the time it took us with a regular pressure washer nozzle. And we got much better results. So it's a keeper in our book!

Use the surface cleaner on horizontal and vertical surfaces like concrete, brick, stone and pavers. However, if you wish to use it on asphalt, wooden decks, fences or siding, you'll have to test it first. It's very aggressive and can damage softer surfaces like these. Check it out at briggsandstratton.com.

ART DIRECTION **VERN JOHNSON** • PHOTOGRAPHY **TOM FENENGA UNLESS NOTED**

THE FAMILY Handyman

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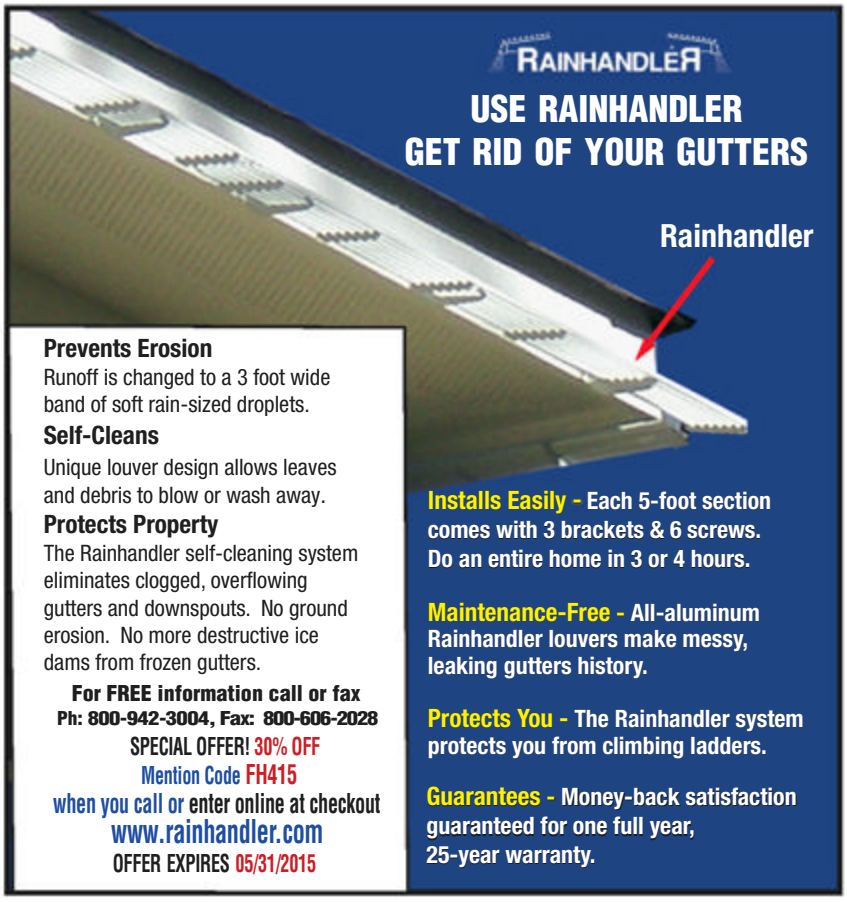

Best concrete anchor ever—never strips, always grips

Need to anchor a bottom plate to a concrete floor, or furring strips to a block wall? Try Perma-grip galvanized steel nails. You'll probably never use anything else again.

All you need is a hammer drill (a masonry bit comes with the nails) and a hammer (a 5-lb. maul is best, but a framing hammer works too). Just put the workpiece in place, drill through it and into the concrete about 1/4 in. deeper than the nail, then pound in the Perma-grip.

These nails are strong—more than 1,000 lbs. of holding strength in solid concrete and almost 400 lbs. in block. And they're durable—the galvanized coating won't chip or corrode, and it's compatible with ACQ treated lumber. The nails are easy to place accurately and, most important, they don't strip.

Once Perma-grips are set, they're pretty much set for eternity. You can cut them off, but you probably can't pull them back out. Perma-grips come in 1/4-in. shank diameter and lengths between 1-1/8 and 7 in. The 3-in. length is perfect for 1-1/2-in. framing lumber; 1-1/2 is best for 3/4-in.-thick wood. Easy, strong, reliable—and as satisfying as pounding 16d sinkers with your framing hammer. Find Perma-grips online at perma-grip.com and fastenmsc.com. A box of 100 3-in. concrete fasteners costs about $20.

James Michaels, Contributing Editor

PRO TOOLS + GEAR

JOHN DEERE

Not a tire, not a wheel ... it's a Tweel

Hey pro landscapers ... you're going to love this. John Deere ZTrak 900 commercial mowers can now be outfitted with Michelin X Tweel Turf tires that won't ever go flat and ride much smoother than pneumatic. The benefits are almost too obvious to mention: no more downtime repairing flat tires and much less bouncing around, which is a big-time back saver.

It will cost $749 to upgrade to the X Tweels, which may sound like a lot, but one set will last as long as three sets of pneumatics. And think of all the money you'll save on chiropractic visits. Right now they're available only for the commercial mowers, but this technology will be rapidly expanding. Check out the video at johndeere.com/tweel.

ROCKLER

OPEN SESAME!

Ever been intrigued by the idea of having a hidden door that opens into a closet or even a whole room? Well, now with 200 bucks' worth of hardware, basic cabinetmaking skills and an existing door opening, you can have your own secret room.

You build the bookcase and assemble it in just about any size door opening and there you go—just like in the movies! The directions tell you how to make the bookcase to fit just about any door opening you have. It hinges in the middle and pivots on one end, and the other end has a wheel that rides in a track on the floor. Pretty cool! Check out the InvisiDoor Bi-fold Bookcase Hardware Kit at rockler.com.

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THE FAMILY Handyman

QUICK-AND-EASY OIL CHANGE

The oil drain plugs on some of my small gas engines are almost impossible to get at with a wrench. And I have one generator that has no clear path for the oil to drain, so it ends up filling the lower frame and making a big mess all over my floor. I recently bought a fluid pump and started sucking the oil out instead of draining it. It works great for all sorts of fluids besides oil. I use it to drain gas from engines I plan to store for more than a few months.

Because it also acts as a siphon, I've used it to drain a small garden pond and a 30-gallon rain barrel. As long as the exit hose is lower than the intake, just give it a few pumps and the water will continue to flow. The only tricky part is keeping the hoses in place. What I find works best is to temporarily secure the hoses in place with a little masking tape. I bought my Fluid Transfer Pump, part No. 25713, for $15 at AutoZone.

Mark Petersen, Contributing Editor

USER-FRIENDLY MITER SAW STAND

I was fed up with my old miter saw stand, so I donated it to one of my adult sons (always a great excuse for a tool upgrade), and bought myself a new one. I wanted one with wheels so I could roll it into the corner of my garage with the saw still attached. I also wanted a stand less complicated than a Rubik's Cube to unfold, and one that wouldn't pinch my fingers in the process. I decided to go with the Craftsman Quick Lift Gravity Stand. All you do is push one foot lever to fold it up and the same lever to unfold it—nothing could be easier.

When you do want to remove the saw from the stand, the quick-release brackets (which fit most saw brands) hook on the front rail first and then click onto the back rail. My other stand was the exact opposite, and I nearly broke my back every time I mounted the saw because I had to bend way over the stand supporting the full weight of the saw and brackets. If you're looking for a user-friendly saw stand with all the features, check out Craftsman's Quick Lift Gravity Stand. It retails for about $190.

Mark Petersen, Contributing Editor

Cheap insurance for your air conditioner

Surges, voltage dips (brownouts) and rapid cycling can send your home's A/C system to an early grave. With the average A/C system costing about $5,000 to replace, it pays to install power protection. The Intermatic Compressor Defender (CD1-024R; $82 at 1000bulbs.com) protects your home's A/C unit against the three most common power-related failures.

First, it monitors line voltage and shuts down the unit when it detects the kind of low-voltage conditions that happen frequently during high-use summer months. Second, the surge protection circuitry safely diverts surges to protect the compressor and condenser fan motors. Third, it shuts down the unit the instant it detects a rapid on/off power flicker. That prevents "short cycling," which causes premature compressor failure.

If you're comfortable working with electricity, you can install the unit yourself (with the A/C and furnace power off). The unit installs at the A/C disconnect panel on the side of your house. However, if you're not comfortable doing it yourself, hire an HVAC pro, who can do the entire installation in less than 30 minutes. That should only cost about $125. We think it makes sense to spend around $200 to protect your $5,000 A/C unit.

Did you know...

Approximately 200,000 insurance claims are filed every year for A/C damage caused by lightning-induced voltage surges. And even more units are destroyed by brownouts and short cycling!

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Handy HINTS®

FROM OUR READERS handyhints@thefamilyhandyman.com

READER PHOTO (2)

HIGH-RISE BIRD FEEDER

We live close to a natural habitat for deer and find that they enjoy our bird feeder as much as the birds do. To keep the food away from the deer, we drove a steel stake into the ground and attached an extendable painter's pole to the stake. We then attached the bird feeder to the other end. Now we can lower the bird feeder, fill it and raise it to keep it "for birds only."

Dick Seils

NOZZLE CLEANER

When you're done spray-painting, pour a couple ounces of paint thinner into a small container. Remove the nozzle, shake it in the covered container, then reattach the nozzle to the can.

Richard Ornorff

Outlet strip protector

I do a lot of power sanding at my workbench, and all the sawdust kept getting into the outlet strip and interfering with the electrical contact. Now I put a strip of masking tape over outlets I'm not using and replace it as needed. The outlet strips last a lot longer!

Helene Lesel

Get a $100 gift card for your Handy Hint! See p. 4 for details.

EDITOR **DAVID RADTKE** • ART DIRECTION **MARCIA ROEPKE** • PHOTOGRAPHY **TOM FENENGA UNLESS NOTED**

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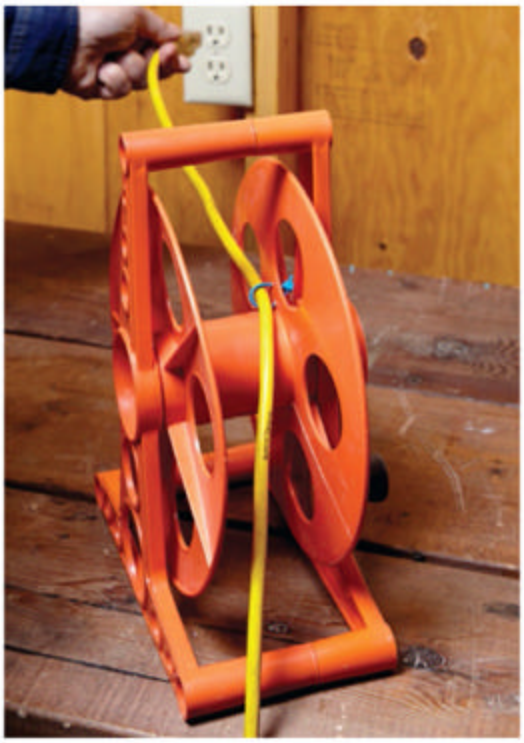
Garden/garage tool caddy

I had some leftover wood and plastic lattice from a fence I was building. Rather than toss the scraps, I decided to use them to build a caddy to organize my garden shovels, hoes and brooms. I installed casters, so it scoots easily into a corner of my garage. Works great!

Philip J. Gruber



CORD REEL SOLUTION

Zip ties are great to have on hand for quick repairs and fastening jobs around the shop. I like to zip-tie one end of an electrical cord so it stays with the cord reel. I keep the connection loose enough that I can pull out enough cord to reach an outlet.

Oliver Rodriguez

Lighted safety glasses

I was working under the kitchen sink and couldn't see what I was doing, so I used zip ties to attach mini flashlights to a pair of safety glasses. Now I use this pair whenever I climb into the attic or do any repairs in unlighted spaces. Everywhere I look is illuminated.

Nathan Rodgers

Check out our iPad edition for a whole lot of bonus Handy Hints. It's available at the App Store.

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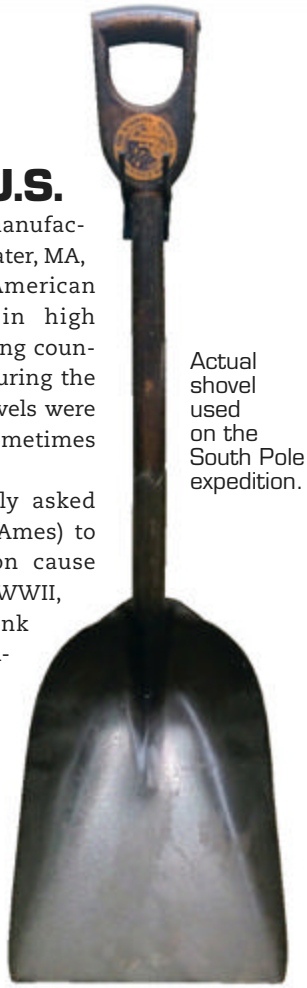
by Mark Petersen
editors@thefamilyhandyman.com

AMES TOOLS

Older than the U.S.

Captain John Ames started manufacturing shovels in West Bridgewater, MA, in 1774—that's before the American Revolution! Shovels were in high demand in the young expanding country, and business was good. During the California gold rush, Ames shovels were so valuable that they were sometimes used as currency!

President Lincoln personally asked Oakes Ames (son of Captain Ames) to supply shovels for the Union cause during the Civil War. During WWII, Ames produced armored tank plating, shell casings and 11 million of those familiar folding entrenching tools. In 1928, Ames shovels proved themselves invaluable on Richard E. Byrd's expedition to the South Pole. Now, after 240 years, you'll still find Ames shovels anywhere DIYers dig.



Actual shovel used on the South Pole expedition.

AMES (2)

The crew of Admiral Richard E. Byrd shoveling snow at the South Pole.

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In 2001, Mark Bergman's hand was tired of holding a paint container, so he rigged up a coffee can with a duct tape handle. It became the prototype for the HANDy Paint Pail, which is now used by do-it-yourselfers nationwide. Ingenuity in action!

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HANDy PAINT PAIL

The HANDy Paint Pail started out as a coffee can wrapped in duct tape.

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LEATHERMAN MULTI-TOOL

Inspired by a clunker

While traveling abroad, Tim Leatherman carried an old Boy Scout knife. He used it for everything from slicing bread to fixing the unreliable car he was traveling around in. The knife was handy, but he kept wishing he had a pair of pliers, so when he got home he designed his first multi-tool.

Tim cut pieces of cardboard to make a pattern for the prototype, which he built in his garage. He shopped the tool around to prospective manufacturers without success, so he decided to manufacture them himself. His first sales came through a mail order magazine. He'd hoped to sell 4,000 "Pocket Survival Tools" that first year, but ended up filling 30,000 orders. The Leatherman Tool Group was born. It currently makes more than a million tools each year in Portland, OR.

LEATHERMAN (2)

Early prototype of the original Leatherman multi-tool.

The car that inspired the first Leatherman multi-tool.

KOHLER

A tub built for hogs—and humans

In 1883, John Michael Kohler coated a large rectangular basin with an enamel powder he'd developed and heated it to 1,700 degrees F. He marketed his product to farmers as a water trough and hog scalder and to the regular consumer as a bathtub. The bathtub was a hit and became the first of thousands of bath products the Kohler Company would go on to manufacture.

Today the Kohler Company headquarters is in Kohler, WI, and it has more than 50 manufacturing locations, employing more than 30,000 people worldwide. It's one of America's oldest and largest privately held companies.

Kohler's first enamel tub. The original ad copy read: "Cast-Iron Enameled Water Trough and Hog Scalders. (Five Sizes) When furnished with Legs can be used as a bathing tub."

KOHLER

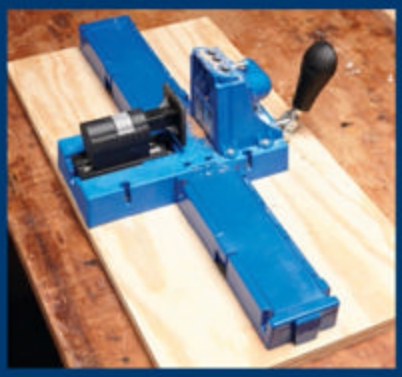
The original "Craig" Jig prototype.

KREG JIGS

Pocket hole joinery for everyone

In 1986, Craig Sommerfeld was in the process of building his own home and wanted a way to attach the face frames to his kitchen cabinet carcasses without nailing through the front of them. Being a tool and die maker by trade and a DIYer at heart, he designed and built his own single-hole pocket hole jig. This first "Craig's Jig" was made from steel and aluminum, and it worked so well that his friends and coworkers encouraged him to build more.

He changed the name to "Kreg" out of modesty and started demonstrating the tool at woodworking shows. The professional cabinet shop folks saw the benefit and were the first to buy the tool, but eventually, a whole lot of us weekend warriors wanted a strong and super-easy way to join wood. Today, Kreg Jig is synonymous with pocket hole joinery.



Modern Kreg Jig

KREG

HSP

Do you know of a DIY-related product that has an interesting history? Tell us about it! editors@thefamilyhandyman.com

✓Yes

✓Yes

xNo

✓Yes

✓Yes

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DAP

From sealing jars to sealing windows

Most DIYers have filled a gap in their window trim or caulked around a tub with some sort of DAP product. But their great, great grandparents may have used products from the same company to seal jelly jars.

In 1865, Robert Dicks began producing sealing wax in his carriage house in Dayton, OH. Later, he teamed up with George Pontius, in time incorporating under the name Dicks-Pontius Company. Eventually, Robert's son, John Dicks, saw an opportunity in home building and introduced putty and caulk to the company's product lineup.

After WWII, the Dicks-Pontius Company was poised to take advantage of the housing boom. They supplied products to builders and carpenters at first and finally to us DIYers. In 1957, the Dicks-Pontius Company merged with Chicago-based Armstrong Company and the name was changed to Dicks-Armstrong-Pontius, "DAP" for short.

DAP

DAP Products Inc. has its origins in sealing wax used to preserve fruits and jellies.

WD-40

39 failures, one big success

WD-40

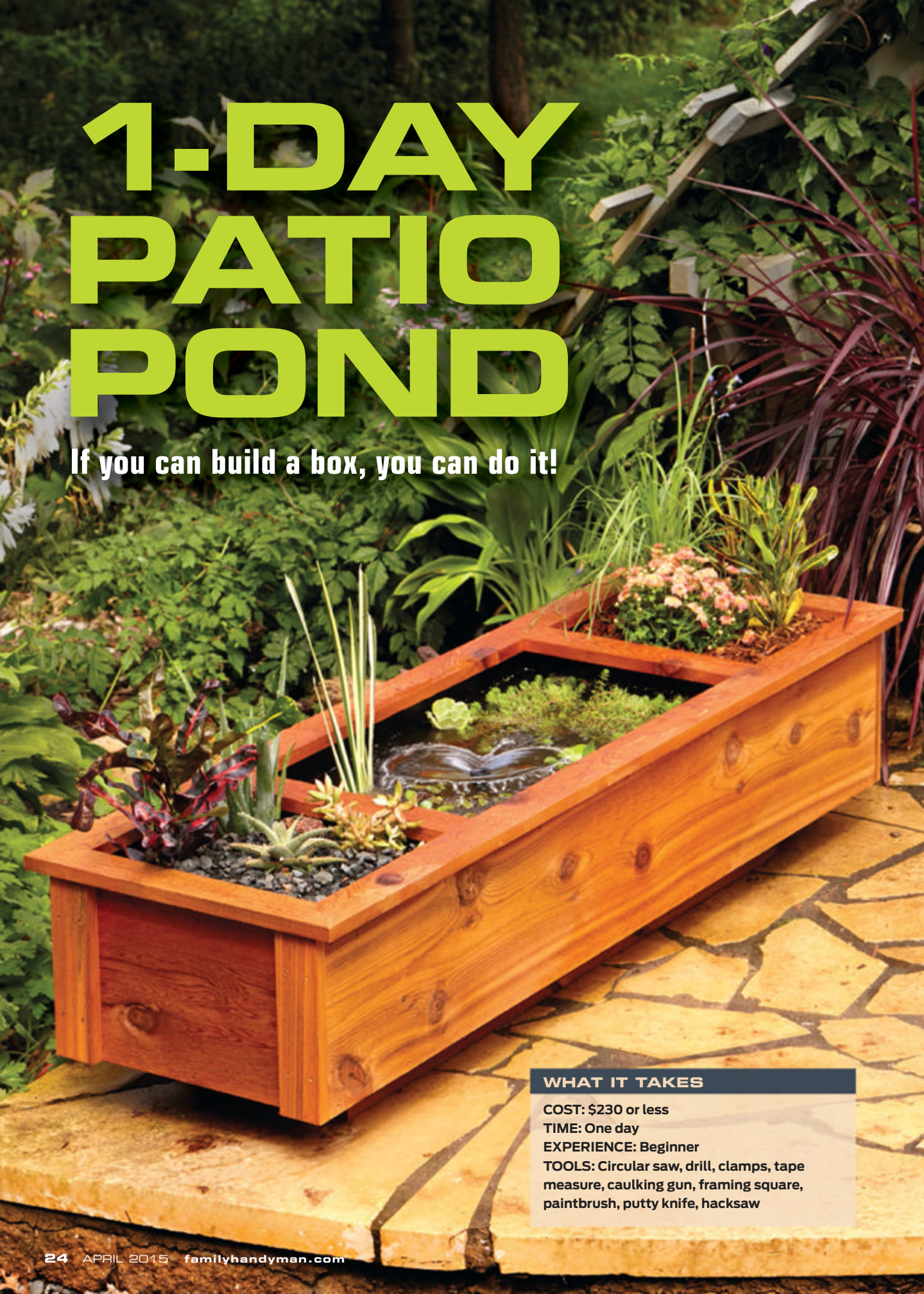
Original WD-40 can that went from industrial shops into our homes.

In 1953, the Rocket Chemical Company of San Diego set out to create a product that could prevent rust on equipment in the aerospace industry. On the 40th try, it came up with WD-40 (Water Displacement, 40th attempt). It was first used by Convair to protect the outer skin of Atlas Missiles from rust and corrosion.

In 1958, company founder Norm Larsen saw an opportunity to sell to the general public and introduced a retail version of WD-40 in aerosol cans. The public loved the product and still does. WD-40 can be found in four out of five homes in America, and the company currently manufactures more than 1 million cans of WD-40 per week.

1-DAY PATIO POND

If you can build a box, you can do it!



WHAT IT TAKES

COST: $230 or less
TIME: One day
EXPERIENCE: Beginner
TOOLS: Circular saw, drill, clamps, tape measure, caulking gun, framing square, paintbrush, putty knife, hacksaw

A SIMPLE BOX WITH A RUBBER LINING

by Mark Petersen
editors@thefamilyhandyman.com

My wife wanted to dress up our patio, so she brought home a few water plants from our local nursery and dropped them in a new lime green plastic planter filled with water. I was impressed with the plants, but the planter…not so much. Being careful not to criticize her buying decision, I decided to ditch the plastic and create a patio pond that would be a little more suitable for the space. I came up with a wooden container that holds both water plants and regular plants. My wife was thrilled with the final results and never even asked where the plastic container ended up.

I wanted a super-easy-to-build water feature, so I designed this wooden box that just about anyone can build with basic tools. What makes it work as a pond is a paint-on rubber lining. There are a few different brands of liquid rubber; I used Rubberize It! Universal Rubber from rubberizeit.com. It's ultra-stretchy and UV-stable, and it can be used on lots of materials, including wood, metal and concrete. It's amazing stuff, though expensive at $75 a gallon.

You can use liquid rubber to fix leaky gutters and metal roofs, seal RVs and trailers, and for many other applications. Ranchers love it for sealing leaks in metal water tanks. And we love it because it can turn just about anything, even a simple wooden box, into a water feature.

Join the bottom boards

Cut the two bottom boards (A and E; see **Figure A**, p. 31) to length. Cuts made at the lumber mill are usually rough, so trim the ends of all the boards before measuring.

I joined all the components with both trim-head screws and construction adhesive. Adhesive works better than wood glue on rough-sawn lumber and is more forgiving on joints that aren't super tight. Apply a bead of adhesive and clamp the two bottom boards together. Scrape off the excess adhesive with a putty knife, and clean the rest with mineral spirits.

Install temporary cleats on the smooth side of the boards, which will be the inside of the container (**Photo 1**). Hold them in place with 1-1/4-in. screws. I used cabinet screws, but other types of screws would work just fine. Don't worry about the screw holes left behind when you remove the cleats; the liquid rubber will fill them in.

Cut the boards to size

The width of 1x12s can vary slightly, so double-check the width of the bottom before you cut the ends and dividers (B and C) to length. The rough-sawn

ART DIRECTION **VERN JOHNSON** • PHOTOGRAPHY **TOM FENENGA** • ILLUSTRATION **FRANK ROHRBACH III**

1 BUILD THE BOTTOM
Glue the bottom boards together with construction adhesive, and install three temporary cleats to hold them together until the project has been assembled.

2 INSTALL THE DIVIDERS
Fasten the dividers to the bottom, and then add the sides. Join all the parts with both adhesive and trim-head screws. Scrape any excess adhesive with a putty knife.

3 ADD CORNER BRACKETS
Cut aluminum angle stock to create corner brackets. Drill four holes in each bracket, and secure them with adhesive and screws.

cedar I used was 7/8 in. thick. If you're working with material that's only 3/4 in. thick, you'll have to adjust the length of the sides.

All the trim parts are made from 1x6s ripped in half. If you don't have a table saw, go to familyhandyman.com and search for "circular saw long cuts" to see a simple guide that lets you make perfect cuts with a circular saw. A few home centers sell 1x3 boards, so you wouldn't have to bother with ripping at all.

Assemble the container

Mark guidelines for the dividers with a framing square 14 in. in from the ends of the bottom. Transfer that line to the inside of the sides (D). Face the smooth sides of the dividers toward the center compartment. That will ensure more even coverage of the liquid rubber in the compartment where it matters most.

Attach the ends and dividers to the bottom with adhesive and three 1-1/2-in. exterior-grade trim-head screws (**Photo 2**). Join the sides with adhesive and screws, three in each side of each end and divider. Space the screws about 10 in. apart along the bottom. The end caps hide the end grain and strengthen the corners. Secure them with four screws and adhesive. Cedar isn't as prone to splitting as harder woods, so I predrilled holes for screws only in areas where a knot was in my way.

Install four aluminum angle brackets (**Photo 3**). Cut them to size with a hacksaw or a jigsaw fitted with a bimetal blade. Drill two holes in each side, and secure them with adhesive and 3/4-in. screws.

Assemble the base with two 3-in. screws into each joint. I found it easier to center the base when the container was upside down. Hold it in place by driving in four screws at an angle. Flip the whole thing over and secure the base to the container with 3-in. screws driven down through the bottom of the container.

After removing the temporary cleats, drill four 1/2-in. drainage holes in the corners of the outside compartments and one in the middle. If you plan to install a water pump, drill a 1-1/2-in. hole for the cord. I used a hole saw. Figure out which side of the container has the best-looking wood grain and drill the hole on the opposite side about 3/8 in. down from the top edge.

Poor man's pocket hole

If you're a regular weekend woodworker, you really ought to get yourself a pocket hole jig. But if you don't have one, here's a quick and easy trick that works well on soft woods like cedar: Start by laying out the face frame, rough side down, and marking two guidelines at each joint. Then drill 1/8-in. holes through the end grain at an angle so the drill bit pops out about 3/4 in. to 7/8 in. down from the end of the board (**Photo 4**). At that length, a 1-1/2-in. trim-head screw will travel about 3/4 in. into the adjoining frame section. If you mess up and drill at a funky angle, you can always drill another hole a little bit over, and no one will be the wiser because it's on the underside of the face frame.

Build the face frame

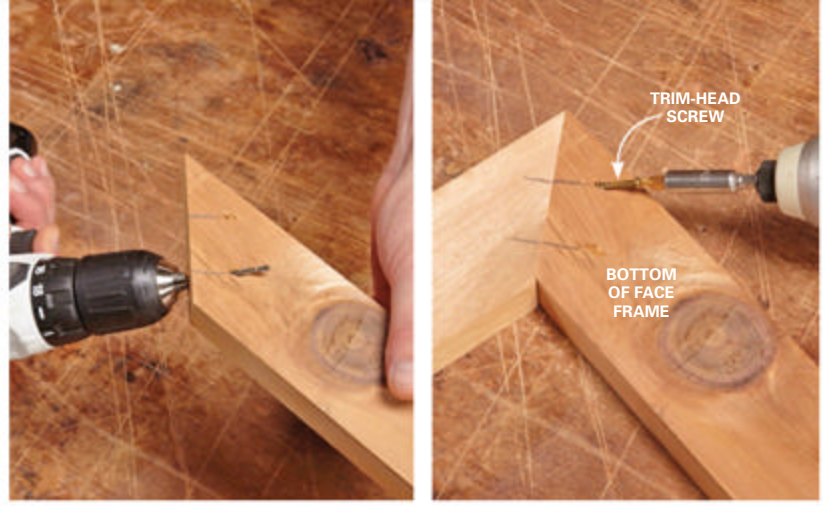
Assemble the sides and the ends of the face frame with two 1-1/2-in. trim-head screws and adhesive (**Photo 4**). Keep downward pressure on both trim boards while driving in the first screw. A wood clamp on the seam works well as a third hand. Before installing the face frame dividers, measure diagonally from one corner to the other both ways to make sure the frame is square. If the frame is a little out of whack, adjust the frame until it's square, and clamp it to your workbench to hold it square.

Apply the liquid rubber and wood finish

Tape off the top edge of the container, the power cord hole and the drainage holes on the bottom. Brush the rubber on thick into the corners, seams, screw holes and defects in the wood (**Photo 5**). It takes three heavy coats to make a watertight seal and at least three hours between coats. I applied only one coat in the two outside compartments because they'll be filled with soil rather than water. I also applied just one coat on the very top edge of the container. Avoid blocking the drainage and cord holes with rubber by mopping the excess out with a cotton swab or rolled-up paper towel. The rubber needs to dry for a few days before it's ready for water.

Rough-sawn cedar isn't supposed to be smooth; hence the name. So resist the urge to sand, and embrace the imperfections. I applied a cedar-tinted wood finish made by Sikkens, but any exterior stain or clear finish would work.

Continued on p. 31



4 BUILD THE FACE FRAME
Join the face-frame parts so that the new screws will be invisible. First, drill pilot holes through the end of one part (left photo). Then just hold the parts together and drive in screws (right photo).

5 APPLY THE LIQUID RUBBER
Glob a thick coat of the liquid rubber into all the seams, corners and defects in the wood. Apply one coat on the outside compartments and three on the middle.

6 SECURE THE FACE FRAME
Clamp the face frame into place and hold it down with adhesive and trim-head screws. Leave the screw heads flush with the surface to avoid pockets where water can pool and penetrate the wood.

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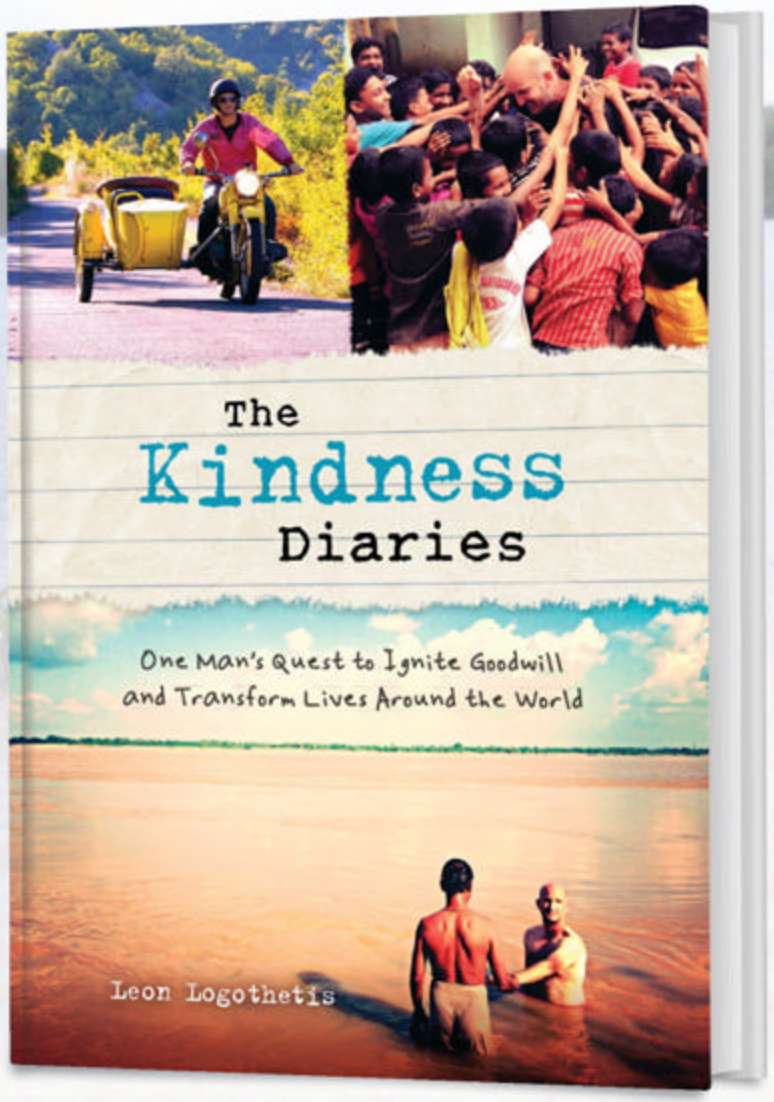

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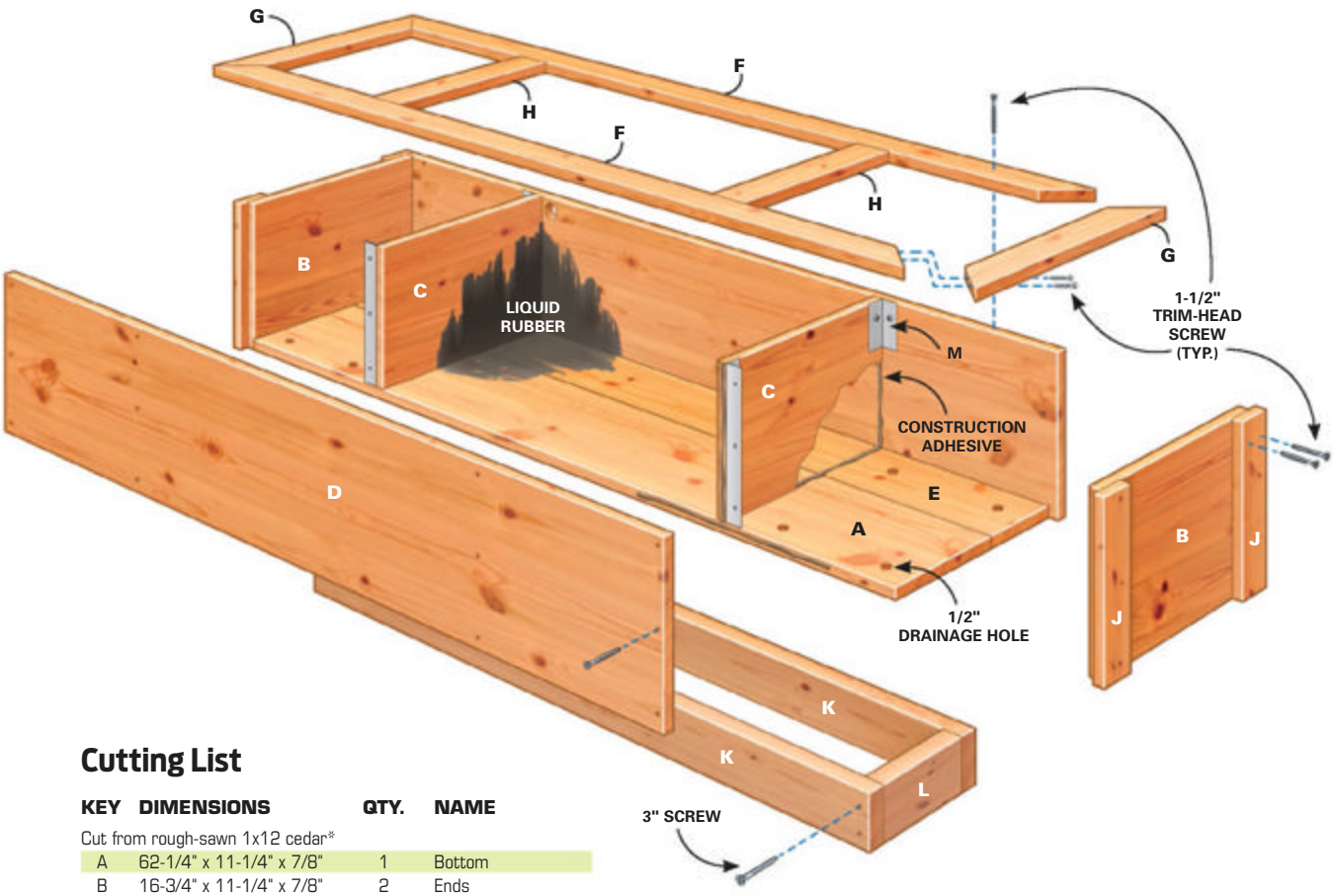
TOH-KD01

Figure A Patio pond

Overall dimensions: 66-3/4" x 21" x 15-1/2"



Cutting List

KEY	DIMENSIONS	QTY.	NAME
Cut from rough-sawn 1x12 cedar*			
A	62-1/4" x 11-1/4" x 7/8"	1	Bottom
B	16-3/4" x 11-1/4" x 7/8"	2	Ends
C	16-3/4" x 10-3/8" x 7/8"	2	Dividers
D	64" x 11-1/4" x 7/8"	2	Sides
*Widths may vary			
Cut from 1x6 rough-sawn cedar			
E	62-1/4" x 5-1/2" x 7/8"	1	Bottom
F	2-11/16" x 66-3/4" x 7/8"	2	Face frame sides
G	2-11/16" x 21" x 7/8"	2	Face frame ends
H	2-11/16" x 15-9/16"	2	Face frame dividers
J	2-11/16" x 11-1/4"	4	End caps
Cedar-tone pressure-treated 2x4			
K	54" x 3-1/2" x 1-1/2"	2	Base sides
L	8-1/2" x 3-1/2" x 1-1/2"	2	Base ends
Aluminum angle stock			
M	10-1/4" x 1-1/4" x 1/16"	4	Corner bracket

Materials List

ITEM	QTY.
1x12 x 12' rough-sawn cedar	2
1x6 x 8' rough-sawn cedar	3
2x4 x 12' cedar-tone pressure-treated lumber	1
1-1/4" x 1/16" x 4' aluminum angle stock	1
Small box of 1-1/2" exterior trim-head screws	1
Small box of 1-1/4" drywall or cabinet screws	1
Small box of 3" screws compatible with pressure-treated lumber	1
Small box of 3/4" screws	1
Tube of construction adhesive	1
Gallon of liquid rubber	1

Finish up and add water

Once the finishes are dry, clamp the face to the container and fasten it with adhesive and 1-1/2-in. trim-head screws spaced every 10 in. or so (**Photo 6**). Set the screws flush with the surface of the wood to keep water from pooling.

A water pump isn't necessary but does help the water stay fresh. Some pumps have suction cups to hold them to the bottom, but the rubber-coated wood may not be smooth enough for them to stick. I laid down a small chunk of Plexiglas at the bottom and stuck the pump's suction cups to that. Floating water plants with exposed roots will clog the pump filter, so only use potted plants, or plan to build some sort of additional screen or filtration system. A pump that moves 120 gallons per hour is plenty big enough for this situation.

Now it's time to fill up your new creation with water and plants. If the local nursery doesn't carry water plants, you can order them online. I got several at pondmegastore.com.

by Elisa Bernick
editors@thefamilyhandyman.com

WATER SMART

SAVE TIME, SAVE WATER & PAMPER YOUR PLANTS

There's an easier way to keep your plants watered, even when your life gets busy or you're away from home—a simple, automated drip irrigation system. These systems are affordable and easy to set up. In small yards, you can complete the job in a day for about $150. Not only will your plants thrive, but you'll also spend less time dragging around hoses and setting up sprinklers.

■ Drip systems deliver moisture straight to the roots instead of blasting water through the air, where much of it evaporates or lands where it isn't needed. That uses a lot less water—up to 70 percent less compared with overhead watering.

■ Automatic watering is also good for plants because it's consistent, eliminates fluctuations in soil moisture and discourages diseases and fungal growth.

ART DIRECTION **VERN JOHNSON** • PHOTOGRAPHY **TOM FENENGA**

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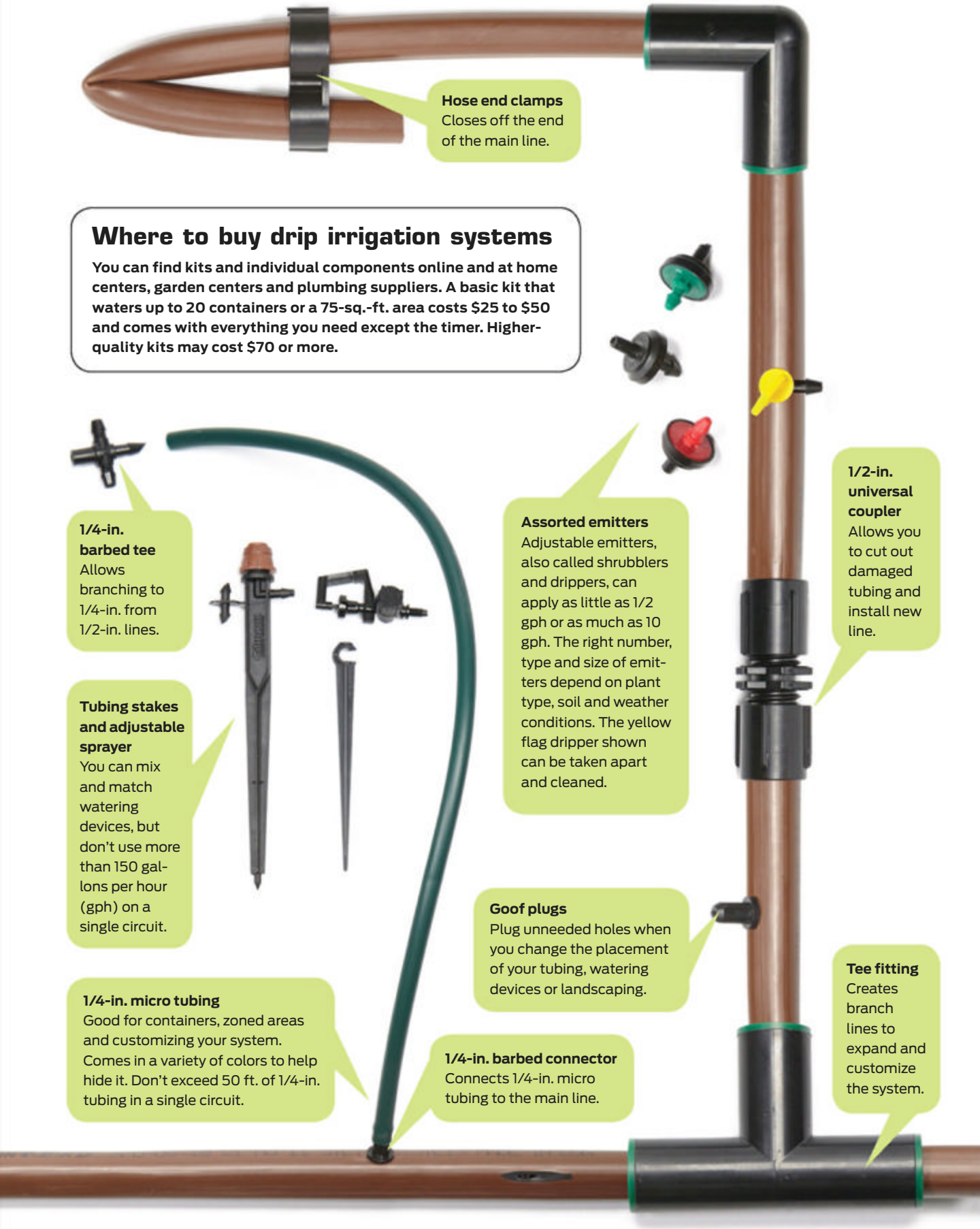
THE BASIC SYSTEM

Drip irrigation systems have been around for years, but the early versions were clunky to install and prone to clogging and leaking. Newer systems are affordable, customizable and leak-proof, and they go together easily. System components vary slightly among manufacturers, but generally, you hook up the faucet assembly at the hose bib and run the 1/2-in. main line around your landscape. You can buy main line with prepunched emitter holes or punch your own holes and install in-line emitters. Or you can use leak-proof connectors to run 1/4-in. tubing to where you need it and attach the watering device of your choice. A basic system goes together in just an hour or two and is easy to expand. There are many excellent videos and other resources online to help you plan your system (see p. 36).

These drip systems are pressure compensated, so the water flow is even throughout the length of the tubing. The different emitters and adjustable spray heads let you vary the amount of water based on the weather and plant needs. There are drip watering systems for all sorts of different landscape elements including trees, vegetable gardens, containers and hanging baskets. You can even convert underground sprinklers to drip water systems. The primary differences among them are the kinds of emitters/watering devices they use.



Where to buy drip irrigation systems

You can find kits and individual components online and at home centers, garden centers and plumbing suppliers. A basic kit that waters up to 20 containers or a 75-sq.-ft. area costs $25 to $50 and comes with everything you need except the timer. Higher-quality kits may cost $70 or more.

INSTALLATION AND DESIGN TIPS

- **Soak the tubing in warm water or lay it out in the sun for a little while to soften it and make it easier to work with.**
- **Hold the hole punch at a right angle to the tubing when you punch a hole for an emitter or a connector. This makes a round hole that will seal tightly around the barb of the emitter.**
- **Flush out the system before installing emitters or other watering devices to clear it of any debris.**
- **Create your lateral lines (1/4-in. tubing and emitters) before hooking them up to the main line.**
- **If you have plants with drastically different watering requirements (like trees and containers), you can add or subtract the number of emitters or sprayers for each plant or, even better, break the system up into zones of plants with similar needs.**

RAINDRIP

Expert tips for container irrigation

Container gardening expert Rosalind Creasy is a writer, lecturer and landscape designer. She is the author of the 10-book "Edible Gardening" series. She also wrote "Edible Landscaping," for which she won the American Horticulture Society Book Award.

Creasy says automatic drip irrigation is perfect for containers because they dry out so quickly and require daily watering in hot weather. She's been using drip irrigation for more than a decade to grow an extensive selection of flowers and edible plants in containers at her northern California home. She says these online retailers—urbanfarmerstore.com, harmonyfarm.com and gardeners.com—are also good sources of information on installation, watering schedules and equipment options.

Here are some of Creasy's tips for using drip irrigation for containers:

- The goal is for the center of the plant's root-ball to be damp but not soggy. Set a timer to water containers twice a day for five to ten minutes, depending on the plant and weather conditions.
- You can also stick a soil moisture probe ($25 online and at garden centers) 6 to 8 in. into the container to check for wetness.
- Watch the plant for signs that it needs water.
- Don't rely on rain for watering because mature plants shed water off the side of the container.
- Choose adjustable emitters and sprayers with flow control so you can adjust the water pattern for individual plants as they grow.
- For hanging baskets, run the 1/4-in. tubing up posts, under eaves or in the joint between two walls.
- Consider adding a fertilizer injector to the faucet assembly so you can feed your plants while you water. These are available online (they start at about $30) and are installed downstream from the backflow preventer.
- Install a good filter and change it every few months or at least once a season, especially if you have alkaline or mineral-rich water.

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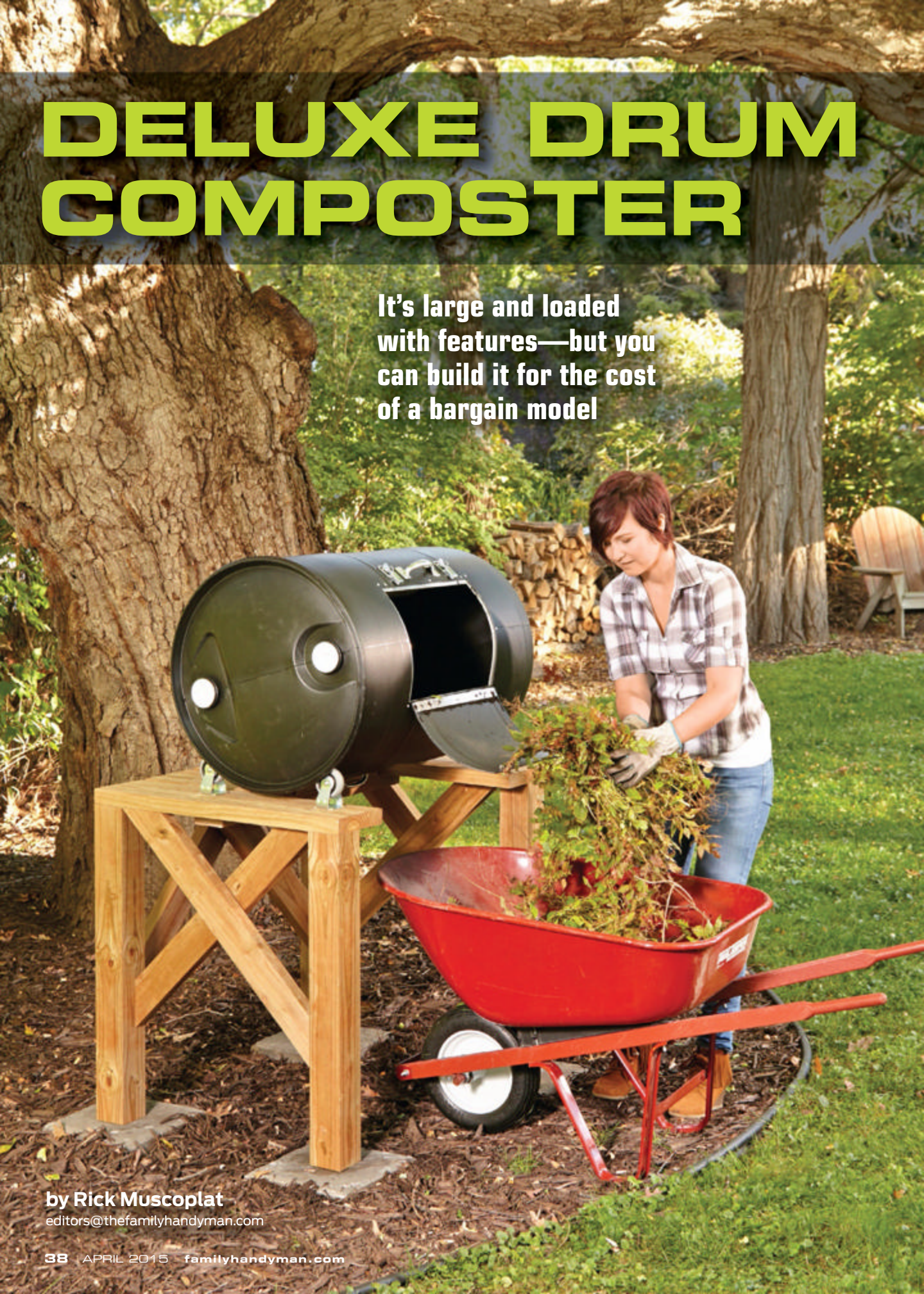
DELUXE DRUM COMPOSTER

It's large and loaded with features—but you can build it for the cost of a bargain model



by Rick Muscoplat
editors@thefamilyhandyman.com

Drum composters convert yard waste to finished compost much faster than stationary compost bins do because they allow you to churn and instantly aerate the waste. Plus, drum composters are easier on your back. You can buy them online or at any garden center for as little as $150 for the smallest units and up to $400 for the large fancy rigs. They all follow the same basic design—a drum on a stand. Our version is an adaptation of that using a plastic 55-gallon drum. The drum and stand together cost about the same as the low-price models, but our composter is built stronger and has more features. It takes a full day to customize the drum and build the stand. We used rivets to speed up the assembly, but screws, nuts and lock washers work too.

Finding and customizing the drum

Ask for free used 55-gallon polyethylene drums at car washes and food processing and industrial manufacturers. Since beggars can't be choosers, you'll probably wind up with a white, green or blue drum. If that doesn't fit your backyard color scheme (paint doesn't stick well to polyethylene), contact a container firm and order the color you want. We ordered a black "tight-head" drum (top permanently sealed to the drum) for $52 from a local supplier.

Next, use a jigsaw to cut a door panel slightly smaller than the width of your wheelbarrow. The next step takes the most time and isn't mandatory, but it adds strength and stability to the entire door assembly: Bend 1/8-in. x 1-in. flat aluminum stock around the drum to form side reinforcements for the door opening. Cut the bent aluminum slightly longer than the door opening and mount it to the drum (**Photo 1**, p. 43).

Then cut flat aluminum pieces for the top and bottom of the door opening and the hinge side of the door. Mount the top and bottom door opening reinforcements in the same manner. Mount the hinges at the bottom of the door opening so the door hangs down when you empty the drum. Finish the door by adding the latches (**Figure A**).

To make stirring paddles, cut an 8-ft. piece of 4-in. PVC pipe in half lengthwise using a jigsaw. Cut the halves to length so they're slightly shorter than the

WHAT IT TAKES

TIME: 1 day

COST: $115 plus the cost of the drum

SKILL LEVEL: Intermediate

TOOLS: Clamps, miter saw, cordless drill, 4-in-1 screwdriver, drill bit set, jigsaw, pocket hole jig, safety glasses and rivet gun

ART DIRECTION **VERN JOHNSON** • PHOTOGRAPHY **TOM FEMENGA** • ILLUSTRATION **FRANK ROHRBACH III**

HOW IT WORKS

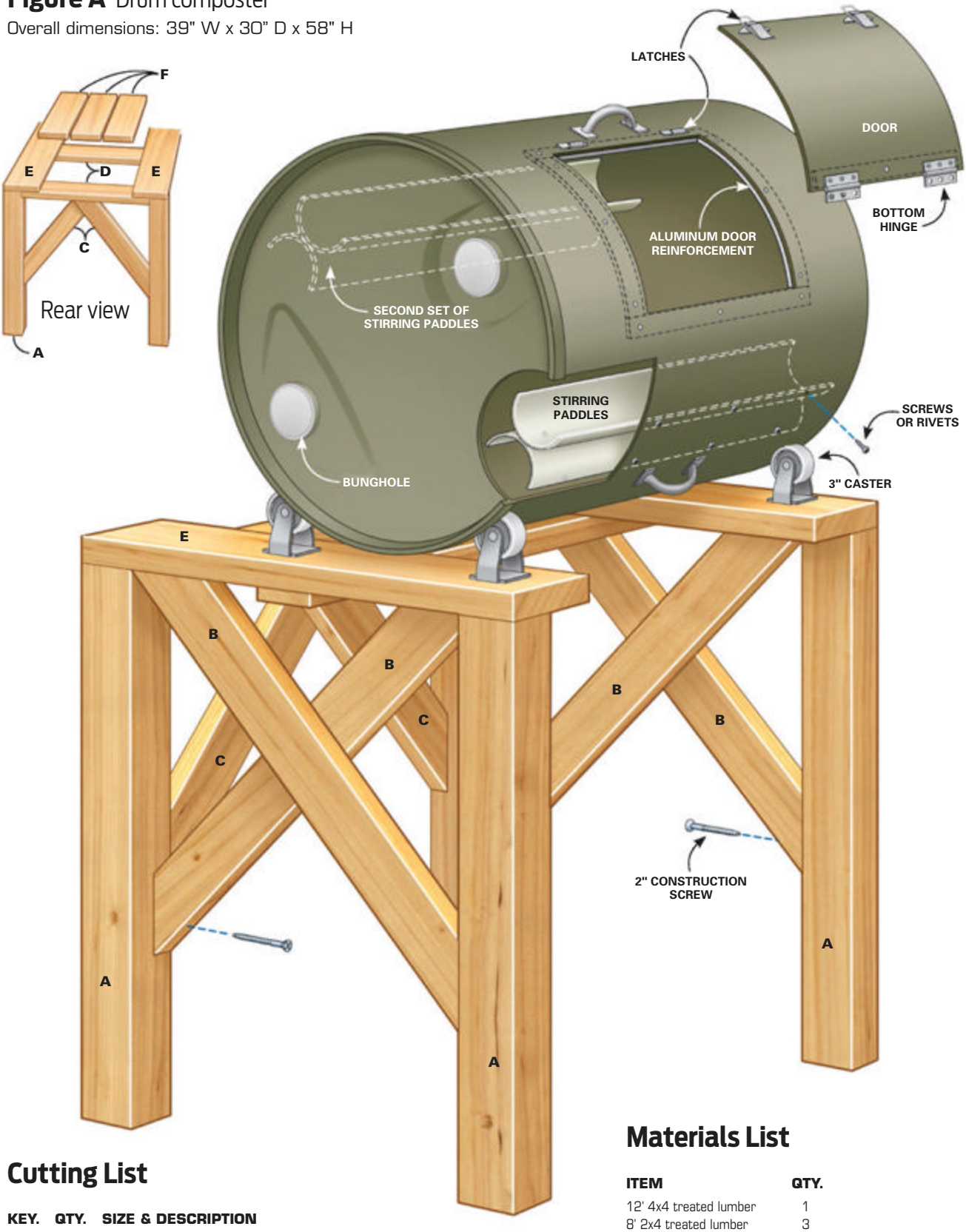
Waste becomes compost thanks to millions of hungry microbes, which break it down and convert it to nutrient-rich fertilizer. Those microbes need oxygen to thrive, and turning the drum daily creates fresh air pockets in the mix. You can accomplish the same thing by churning a pile of compost with a shovel, but a drum composter makes it easier. And the more thorough mixing speeds decomposition.

ROTATE DAILY
Screw the bung caps into the holes to prevent compost from leaking out. Then grab the handles and rotate the drum several times in either direction to stir the mixture.

DROP, ROLL AND DUMP
Park your wheelbarrow under the drum and open the door. As you roll the drum downward, the compost will dump right into the wheelbarrow.

Figure A Drum composter

Overall dimensions: 39" W x 30" D x 58" H



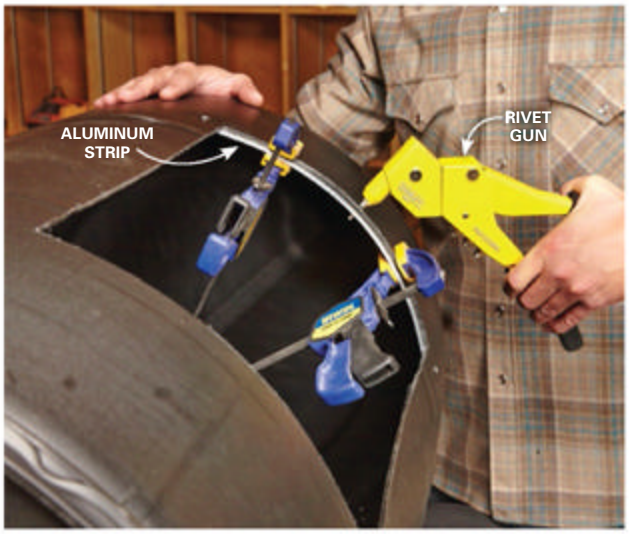
Cutting List

KEY.	QTY.	SIZE & DESCRIPTION
A	4	4x4 x 32-1/2" (legs)
B	4	2x4 x 32-3/8" (side braces; cut at 45-degree angle, long point to long point)
C	2	2x4 x 30" (back braces; cut at 45-degree angle, long point to long point)
D	2	2x4 x 32" (cross braces)
E	2	2x8 x 30" (drum deck)
F	3	2x8 x 13-1/2" (deck, evenly spaced; optional)

Materials List

ITEM	QTY.
12' 4x4 treated lumber	1
8' 2x4 treated lumber	3
10' 2x8 treated lumber	1
6' of 4" PVC pipe	

Rivets (aluminum), nuts and bolts (stainless steel), hinges, handles, 1" flat aluminum stock, latches, exterior screws, 3" casters.



1 REINFORCE THE DOOR OPENING
Clamp aluminum strips in place so 1/2 in. extends into the door opening. Fasten the strips with rivets or nuts and screws.

2 INSTALL THE PADDLE
Taper the ends of the paddle to match the tapered ends of the drum. Sand the paddle with a belt sander until it fits. Then install the paddle with screws.

3 ASSEMBLE THE STAND
Screw the legs to the rails. Then install the cross braces. Strengthen with diagonal struts.

4 MOUNT THE CASTERS
Then set a level on top of the drum and pry the drum up with a board. When the drum is level, position the last caster, mark its location and screw it into place.

inside height of the drum. Arrange two halves back-to-back. Then drill and screw the pieces together to form one paddle unit. The back-to-back design is stronger than a single "scoop" and allows you to rotate the drum in either direction. Repeat for the second paddle unit.

Since the drum has a taper at the top and bottom, you'll have to sand the ends of the paddles to match (**Photo 2**). Mount the paddle units 180 degrees apart and secure them to the drum with screws, nuts and washers. Finally, mount grab handles around the drum to rotate it.

A tight-head drum comes with two threaded "bung-holes." Remove the threaded caps to provide ventilation. You may need to drill additional ventilation holes if the mixture stays too wet.

Build the stand and mount the rollers

Cut the legs and deck boards to length according to the Cutting List. Then assemble the stand using a drill and exterior screws (**Photo 3**). Add diagonal struts to prevent front-to-back and side-to-side movement when spinning the drum.

Flip the stand upright and mount two casters so they ride in the recess around the drumhead. Then level the drum and mount the remaining two casters (**Photo 4**).

Load, spin and dump

Load the drum with yard waste and add a compost starter to get the batch cooking (about $10 at any home or garden center). Rotate at least once every day to mix and aerate the batch. When the compost is ready, just dump it out.

Ridiculously simple STOOLS

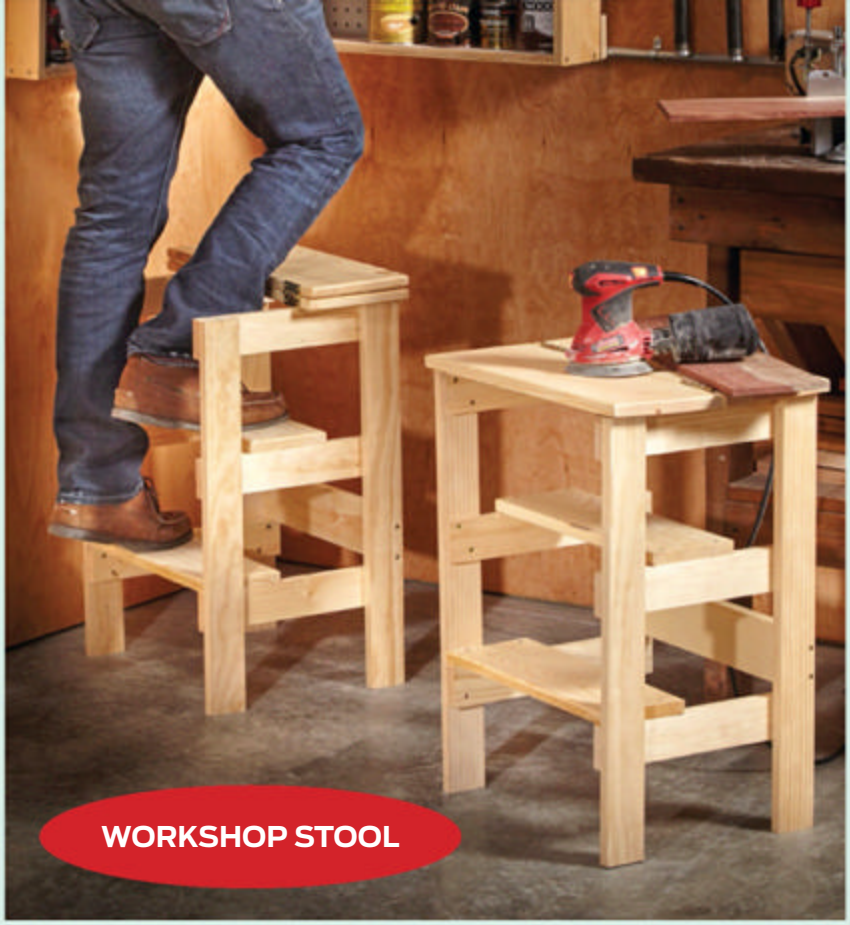
Three stools inspired by the concept "simpler is better"

by Spike Carlsen
editors@thefamilyhandyman.com

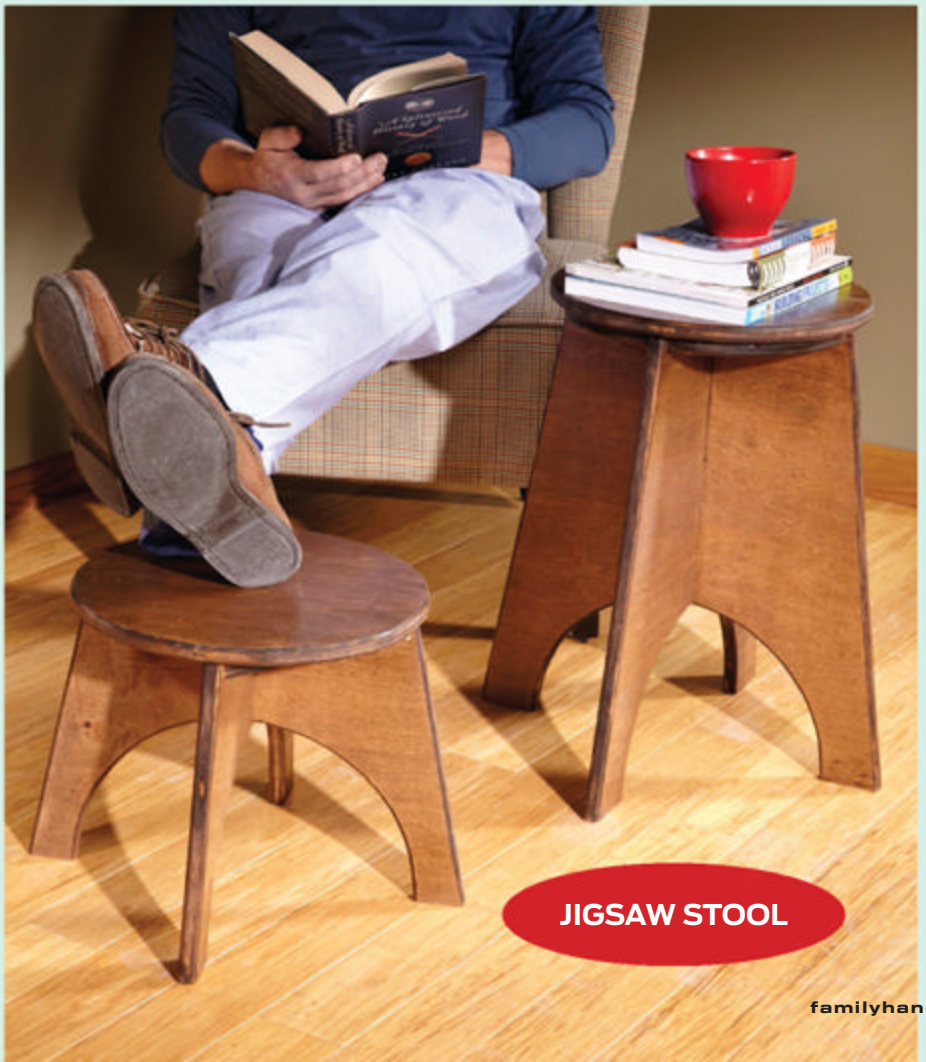
FLIP-FLOP STEP STOOL

I love projects that allow me to walk into my workshop with a few boards under one arm and then walk out a few hours later with something sturdy, useful and attractive. In other words, I like simple projects. Even more, I like ridiculously simple projects. I like them so much that a few years ago I wrote a book called "Ridiculously Simple Furniture Projects."

Here are three stools inspired by that "simpler is better" concept.



WORKSHOP STOOL



JIGSAW STOOL

Glue-and-screw furniture can look awesome

The three projects in this article have a few things in common: They're all stools, they're all made with dimensional lumber or plywood, and they're all better looking because they've been "dressed up" with a round-over router bit.

How often do I use that bit? So often that I have it in a dedicated router so that it's always ready to go. Round-over bits have a way of making jigsaw cuts look smoother, straight cuts look straighter, cheap wood look classier and paint jobs look better. Round-over bits also make wood furniture more comfortable to sit on and touch.

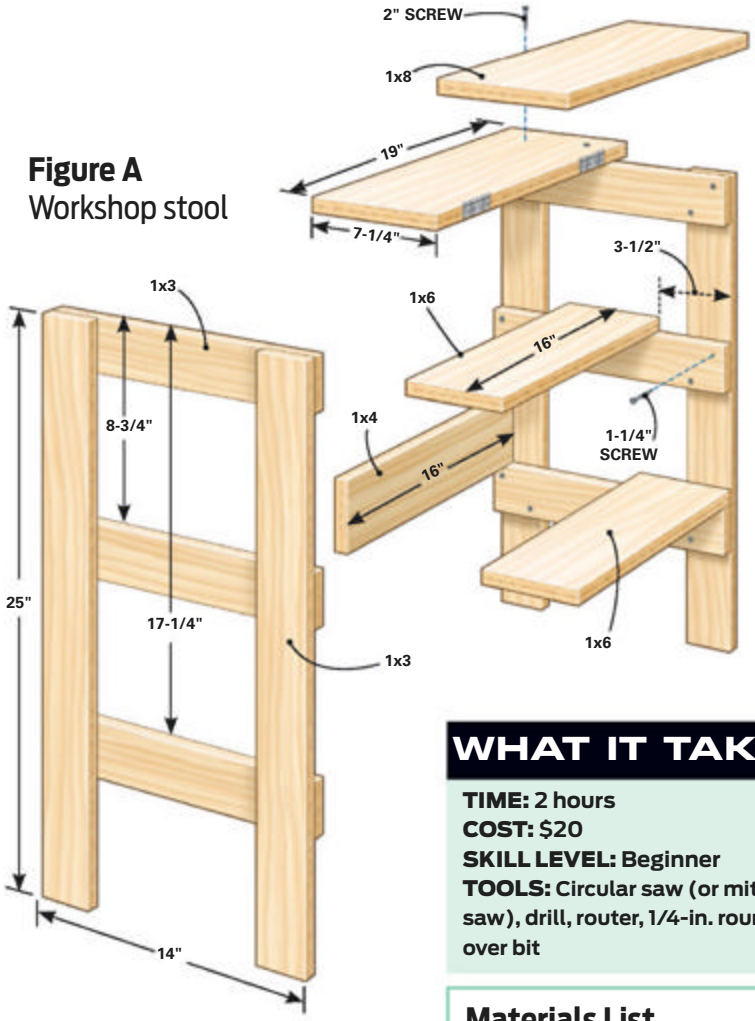
WORKSHOP STOOL

Flip the top down and you have a stool for sitting or working; flip it up and you have a small stepladder for reaching. Build two of them and you have sawhorses for supporting sheets of plywood or long boards when working.

Begin by building the two side ladders using the spacing shown in **Figure A**. Use a square to ensure each "rung" is square to the leg, then secure each using glue and 1-1/4-in. screws (**Photo 1**). Use a 1/4-in. round-over bit to soften the outer edges of each leg. Stand the two ladder sides facing each other and install the two steps and the back brace. Predrill the holes to prevent splitting.

Cut the two top boards to length and round over the top edges. Secure the two top edges to each other using 2-1/2-in. no-mortise hinges; regular hinges will also work but will leave a slightly wider gap. Position the hinged-together top boards so they overhang the sides of the legs by about 3/4 in. and the front and back by about 3/8 in. Attach one of the top boards to the top "rungs" of the ladder using 2-in. screws.

Figure A
Workshop stool



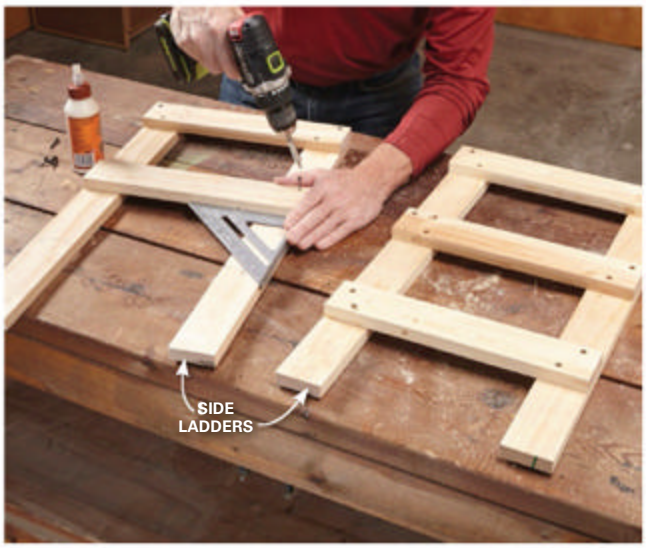
Overall dimensions:
19" W x 14" D x 25-3/4" H

WHAT IT TAKES

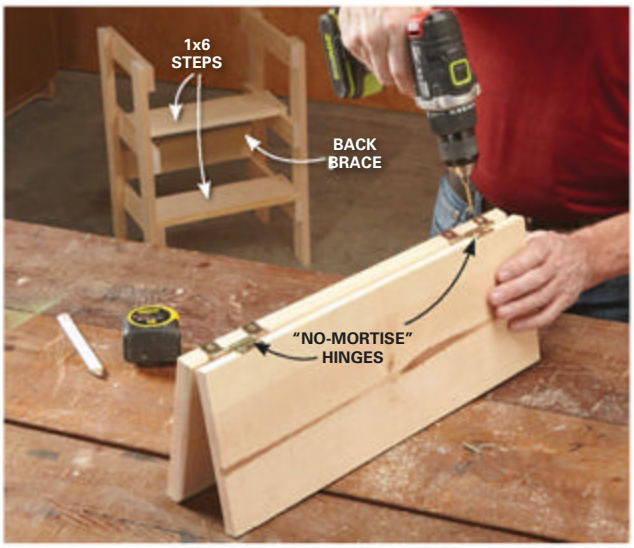
TIME: 2 hours
COST: $20
SKILL LEVEL: Beginner
TOOLS: Circular saw (or miter saw), drill, router, 1/4-in. round-over bit

Materials List

16' 1x3, 2' 1x4, 3' 1x6, 4' 1x8, hinges, 1-1/4" screws, 2" screws, wood glue



1 BUILD THE TWO SIDE LADDERS
Cut the pieces to length, then glue and screw the crosspieces to the legs. Use a square to ensure the assemblies are square.



2 PUT IT ALL TOGETHER
Attach the two steps and the back brace to the ladder sides. Use hinges to join the two top pieces, then secure one of the boards to the top "rungs."

ART DIRECTION **MARCIA ROEPKE** • PHOTOGRAPHY **TOM FENENGA and GARY SUNDERMEYER** • TECHNICAL ILLUSTRATION **FRANK ROHRBACH III**

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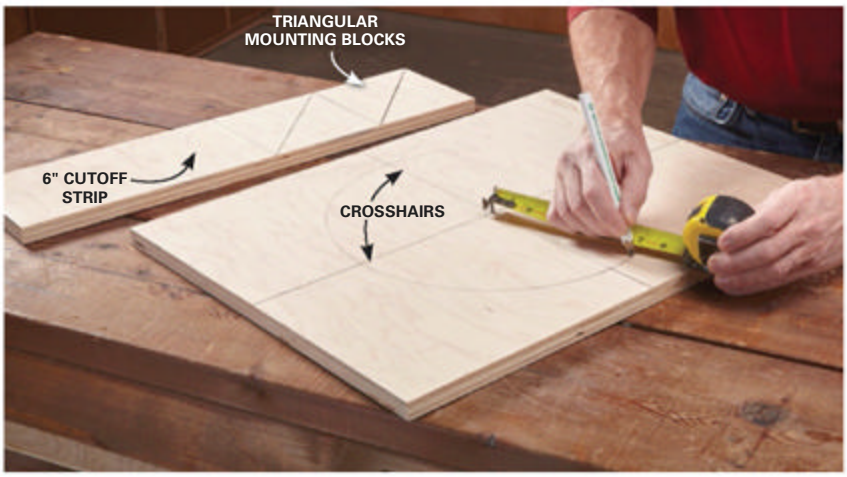
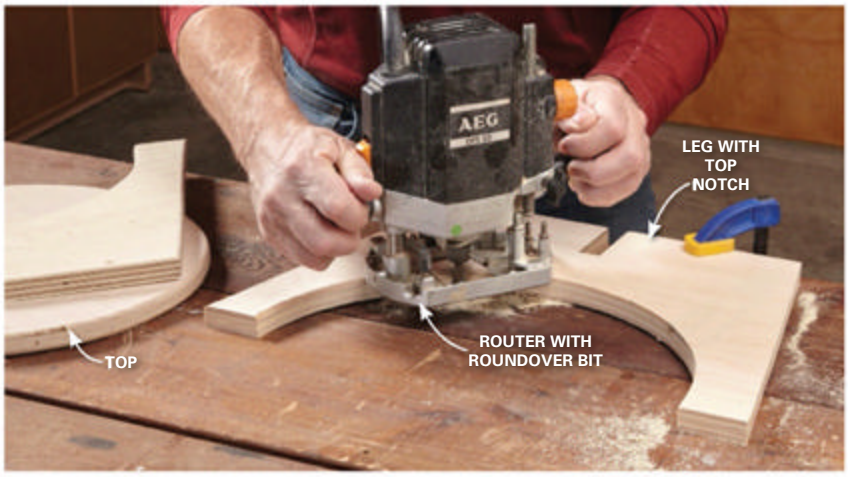
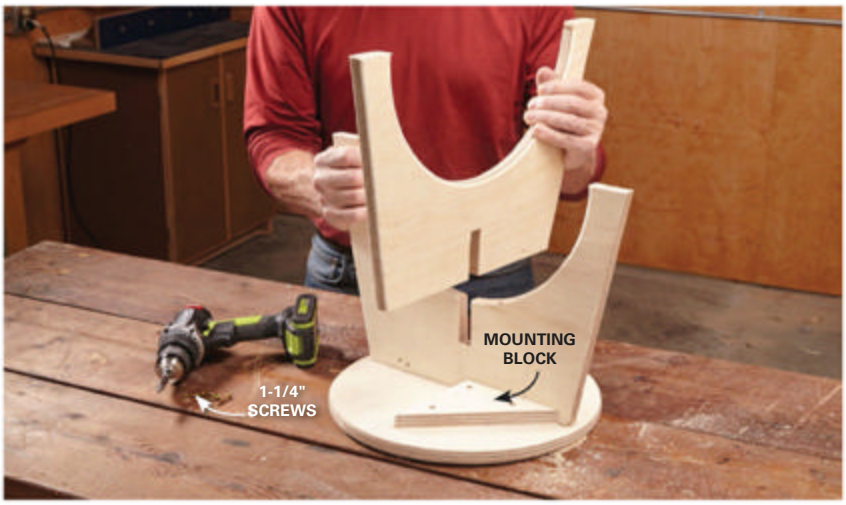


1 LAY OUT THE LEGS AND TOP
Rip the plywood into 18-in. and 6-in. strips. Draw "crosshairs" on the larger piece, drive a screw in the center, hook your tape over it, then with a pencil snugged against the 7-in. mark, draw the circle. Cut four support blocks from the narrow piece.



2 CUT OUT THE PARTS AND ROUT THE EDGES
Use a jigsaw to cut out the parts (see Figure A), then use a router with a 1/4-in. round-over bit to ease the edges as shown.



3 ASSEMBLE THE STOOL
Screw two triangular blocks where the top layout marks intersect (kitty corner from each other), then secure the legs using 2-in. screws. Install the other two blocks, then apply a finish.

JIGSAW STOOL

You want simplicity and economy? These stools are designed so you can create eight of the short ones or four of the tall ones (or combinations thereof) from a single sheet of plywood. Here we'll show you how to build the short version; the taller stool is a couple inches wider, but employs the same concept to build.

Rip a 24 x 24-in. piece of plywood into 18-in. and 6-in. strips, then draw "crosshairs" (**Photo 1**) to locate the center of the larger board. Drive a drywall screw in the center and use that as a pivot point for swinging a 7-in.-radius circle. Draw lines 3/8 in. away from the crosshairs on each side (**Figure A**) to create 3/4-in.-thick layout marks for cutting the interlocking notches and installing the leg brace blocks later on.

Drill a 1/2-in. pilot hole in the lower notch as shown in **Figure A**, then insert a fine-tooth jigsaw blade and cut out the round top. Use your jigsaw to cut out the legs and the 3/4-in. x 2-1/2-in. notches for interlocking the legs. Use a router with a 1/4-in. round-over bit to soften both sides of the top and legs except for those edges along the tops of the two legs (**Photo 2**). If you don't have a router, ease the sharp edges with sandpaper. Cut the triangular blocks from the 6-in.-wide cutoff (**Photo 1**) and secure two of them to the underside of the top disc with glue and 1-1/4-in. all-purpose screws. Slip the legs into place as shown in **Photo 3**, then secure them to the blocks using 2-in. screws. Add the other two triangular blocks and apply a finish of your choice. We applied sanding sealer, a dark stain and then a coat of polyurethane.

WHAT IT TAKES

TIME: 2 hours per stool
COST: $8
SKILL LEVEL: Beginner
TOOLS: Jigsaw, drill, router and round-over bit

Figure A
Jigsaw stool plywood layout (short version)

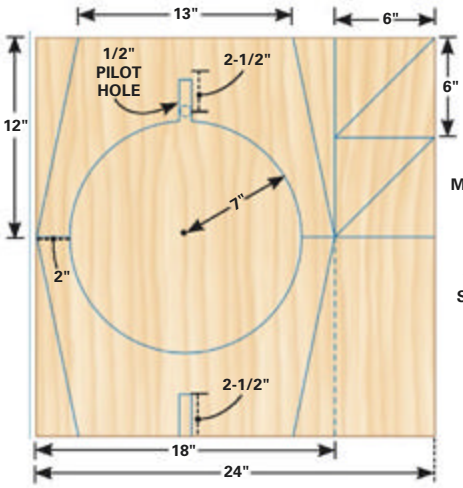


Figure B
Jigsaw stool plywood layout (tall version)

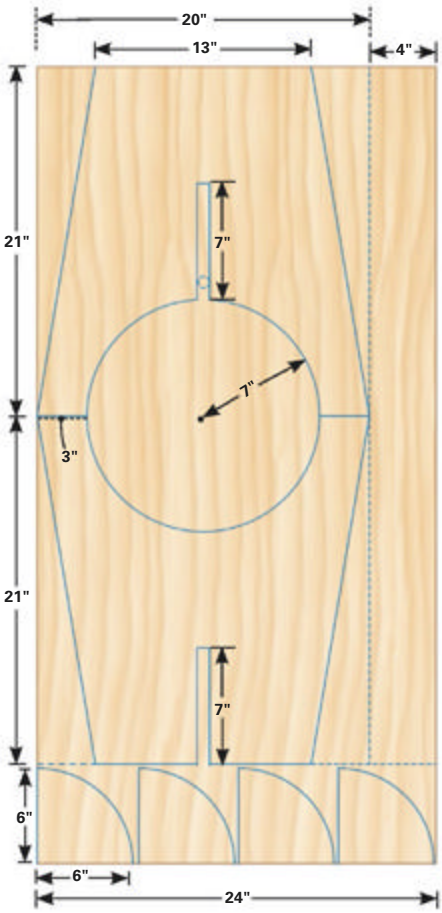
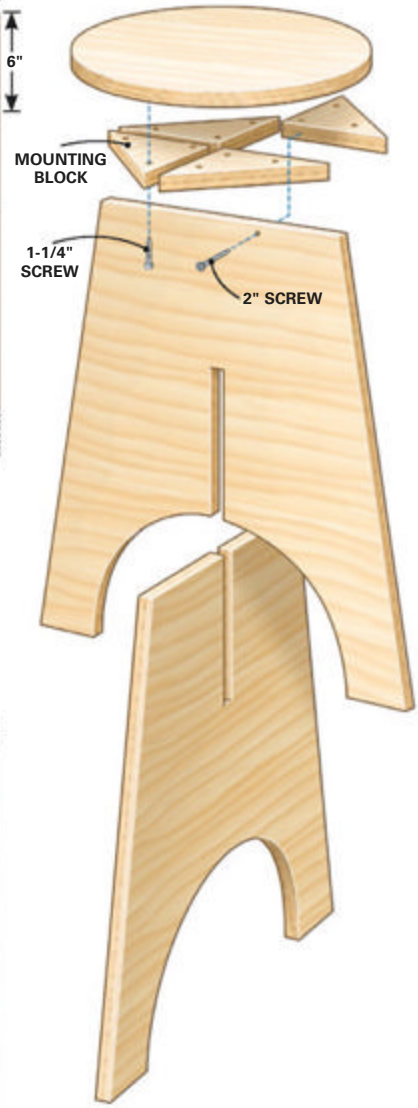


Figure C
Jigsaw stool assembly (tall version)



Overall dimensions

Short version:
18" W x 18" D x 12-3/4" H

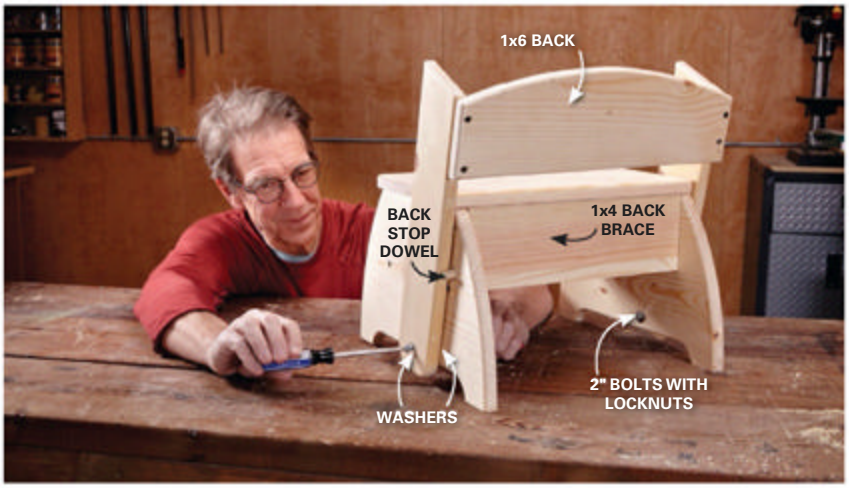
Tall version:
20" W x 20" D x 21-3/4" H

Materials List

Short stool: 3/4" x 24" x 24" plywood
Tall stool: 3/4" x 24" x 48" plywood
1-1/4" screws, 2" screws, wood glue

1 MARK THE TWO SIDE PIECES
Use a tape measure to swing arcs for the edges as shown in Figure A, then mark the holes for the pivot screws and the back dowel stop.

2 ASSEMBLE THE STOOL WITH 2-IN. SCREWS
First screw the back brace to the bottom shelf, then secure this L-shape assembly to the sides. Drill the holes for the pivot screw and the back dowel stop.



3 INSTALL THE BACK
Screw the back to the pivot arms to create a U-shape. Drill the holes in the pivot arms, then secure the back using 2-in. bolts, washers and nuts. Don't permanently fasten the top until you've "test swiveled" the back to make sure you have enough clearance.

FLIP-FLOP STEP STOOL

You'll find plenty of uses for a flip-flop stool. With the back swung up, it's the perfect chair for little kids to plunk down on. With the back swung down, it's the perfect step stool for reaching slightly-out-of-reach faucets, shelves and cabinets—for kids of all ages.

Begin by cutting the two sides to length and laying out the boards (**Photo 1** and **Figure A**). Note that the sides will be mirror images. To mark the curved sides, hook your tape over the lower corners then swing 15-in.-radius curves on each side. Use a pint can to create the rounded inner edges of the legs. The positions of the pivot and dowel holes are critical, so measure carefully. The pivot hole goes all the way through the board, but the dowel holes are only 1/2 in. deep. Drill the holes, then use a jigsaw to cut out the parts. Use a 1/4-in. round-over bit or sandpaper to soften all the edges.

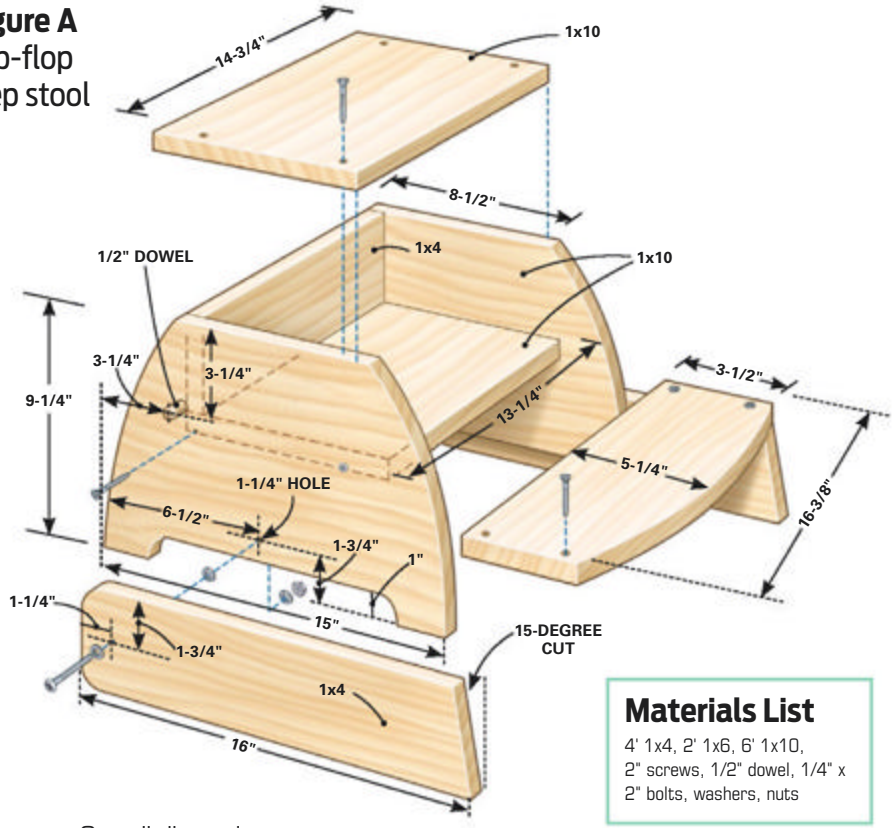
Connect the 1x10 bottom shelf and 1x4 back brace to create an "L." Secure this assembly to the sides so the top edge of the 1x4 is flush with the upper back corner of the sides. Use 2x4 blocks to ensure the right spacing (**Photo 2**).

Cut the three parts for the back assembly (**Figure A**). To create the curved back, drive a pair of finish nails 3-1/2 in. from the edge of a 1x6, and flex a thin piece of wood upward between the nails to create an arc. Mark the arc with a pencil, then cut it out with a jigsaw. Secure the back to the two 1x4 sides to create a U-shape. Use 2-in. bolts (**Photo 3**) to secure the back assembly to the sides of the stool. (**Tip**: To install the washer between the back assembly and the stool, tape it over the hole in the side before installing the assembly.) Finally, position the top far back enough—about 1/2 in. from the front of the sides—so the back doesn't hit the front lip as it pivots.

WHAT IT TAKES

TIME: 3 hours per stool
COST: $20
SKILL LEVEL: Beginner
TOOLS: Jigsaw, drill, router, 1/4-in. round-over bit

Figure A
Flip-flop step stool



Overall dimensions:
16-3/8" W x 15" D x 16" H (in chair mode)

Materials List

4' 1x4, 2' 1x6, 6' 1x10,
2" screws, 1/2" dowel, 1/4" x 2" bolts, washers, nuts

MEET THE BUILDER

Spike Carlsen is a Contributing Editor to The Family Handyman magazine and the author of five books including "Ridiculously Simple Furniture Projects" (Linden Publishing).

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BY RICK MUSCOPLAT editors@thefamilyhandyman.com

How to seal a driveway

An asphalt driveway can last almost 30 years. But you can't achieve that long life span unless the driveway was installed properly *and* you perform regular maintenance, like filling cracks annually and applying sealer when needed. We covered the art of filling asphalt cracks in the March '15 issue. In this story, we'll show you how to clean and prepare the driveway so you get the longest life and best protection from driveway sealer.

Preparation can take a full day (including drying time), and it's tedious. The application phase is much faster, taking only a few hours per coat for a typical driveway. Most sealer manufacturers recommend two coats with a minimum drying time of eight hours between coats, so this project will fill an entire weekend.

The materials cost about $100, but you'll save about $200 in labor over a professional job. A power washer speeds the cleaning process, but you can do the job without it. In addition to a squeegee or application brush, you'll need a broom, drill, mixing paddle, duct tape, dashing brush and poly sheeting to protect painted surfaces.

Buying the right materials

Driveway sealer is available in various grades and price ranges, from as little as $15 per 5-gallon pail to about $35 per pail for a premium product. Some bargain products contain almost 50 percent water and have lower coverage rates and a correspondingly shorter guarantee, so they're not the most cost-effective solution over the long term. Use one of them if you're trying to spiff up the driveway before selling your home. Premium products, on the other hand, are made with higher-quality resins and UV stabilizers and contain filler and elastomeric material, so they last longer and carry a longer guarantee.

ART DIRECTION **MARCIA ROEPKE** • PHOTOGRAPHY **TOM FENENGA**

AVOID THESE COMMON DRIVEWAY-SEALING MISTAKES

- **Depending on the sealer to fill cracks. It won't. Fill them properly before applying sealer.**
- **Failure to clean and prep the driveway before applying the sealer. If you don't want to spend time cleaning the driveway, you may as well skip the sealer too, because it won't stick to a dirty driveway.**
- **Failure to stir properly. Don't depend on a stir stick. It simply won't blend the water and solids enough to get a consistent mixture.**
- **Use of the wrong applicator. Using a brush when the manufacturer specifies a squeegee (or vice versa) will cause premature sealer failure.**
- **Applying sealer too often. Too much sealer will flake off. Wait until you begin to see asphalt aggregate before you apply a new coat of sealer.**

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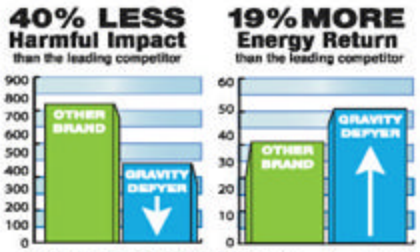

SHOCK ABSORPTION STUDY HPW Biomechanics, 2012
Shock absorption: Measurement of maximum pressure (KPI).
Energy return: Measurement of energy returned (Joules).

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Manufacturers also make different formulas for different driveway conditions: one formula for newer driveways in good condition and another formula for older driveways that haven't been well maintained. The two formulas also vary in their coverage, so read the labels carefully and choose the correct sealer and quantity for your particular driveway. Follow the manufacturer's directions for the type of applicator to use (brush or squeegee). Using the wrong one can cause premature failure.

You'll also need liquid driveway cleaner/degreaser to remove oil and tree sap. If your driveway has visible oil stains, pick up a bottle of oil spot primer.

Check the weather before you start

You'll need at least two days of dry weather to seal your driveway. Temperatures must be above 50 degrees F during application and throughout the night. And, it's best to avoid scorching-hot sunny days (the sealer may dry too fast). If you ignore the weather forecast, you may see $100 worth of sealer wash away in a heavy rain.

Start with cleaning and priming

Even if you think your driveway is clean, trust us, it isn't. Exhaust gas contains combustion byproducts that deposit a light, sometimes oily film on your driveway. That film, along with dirt and tree sap, must come off if you want the sealer to stick. So clean the driveway first (**Photo 1**).

Next, rinse the driveway with clear water (**Photo 2**). Let the driveway dry completely before applying the sealer. Then perform a final sweep with a push broom. Treat any oil stains with an oil spot primer (**Photo 3**).

Mask, stir, and trim

Driveway sealer will splash onto your garage door and sidewalks as you pour it. And it'll get all over your shoes and clothes. It's very difficult (often impossible) to remove later, so wear old work clothes and shoes. Mask the garage door with poly sheeting and apply strips of duct

1 SOAP AND SCRUB
Use the soap nozzle on your power washer or a garden hose applicator to apply the driveway cleaner. Then scrub the entire driveway with a stiff-bristle push broom.

2 RINSE WITH A STRONG STREAM
Flush the soap and dirt residue with a 40-degree power washer nozzle or a strong stream of water from your garden hose.

3 PRETREAT THE OIL STAINS
Pour the oil spot primer on the damaged areas and brush it into the pores with a disposable chip brush. Apply a second coat to heavier stains. Let the primer dry fully before applying the driveway sealer.

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4 MIX THE SEALER
Start the mixing paddle near the top of the pail and slowly lower it into the contents settled at the bottom. Cycle the mixing paddle up and down while it spins to combine the water and solids into a smooth consistency.

5 CUT IN THE EDGES
Dip the dashing brush into the sealer and apply a liberal coating to all four edges of the driveway. Don't spread it too thin; you want it to fill in all the pores.

tape to concrete walks where it butts up to the asphalt.

Choose an area on the driveway for mixing and cover it with poly sheeting to protect against spills (dried spills will show through the sealer). Remove the pail lids and cut a small hole in the center of one lid. Use that lid to prevent splashing during mixing. Stir until the mixture is smooth (**Photo 4**).

Next, cut in all four edges of the driveway with a large dashing brush (**Photo 5**). Clean the brush with soap and water as soon as you're done cutting in the edges—you'll need it again the following day. Then stage the pails equally down the driveway (**Photo 6**).

Pour and spread

Pour the sealer onto the driveway (**Photo 7**). Then spread the puddle with a squeegee or broom, depending on the manufacturer's directions (**Photo 8**). Pour enough sealer to maintain a puddle in front of the applicator tool.

When you reach the bottom of the driveway, cap the remaining pails and clean the squeegee or brush. Set the empty pails along the curb to prevent cars from ruining the job. Then let the sealer dry overnight.

Repeat the sealer application the next day. Let the sealer dry for 48 hours before driving on it (better safe than sorry). Don't ask how we learned that lesson.

6 STAGE THE PAILS
Guesstimate the coverage of each pail and stage each additional pail along the driveway. That saves time and reduces the need to walk through wet sealer to get the next pail.

7 POUR ONTO THE DRIVEWAY
Start at the top left or right edge of the driveway and pour the sealer in an upside-down U-shape pattern.

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Driveway sealers: Real protection or just black paint?

Some asphalt driveway companies tell their customers that driveway sealer is a waste of money, that it's cosmetic and doesn't do anything to extend the life of the asphalt.

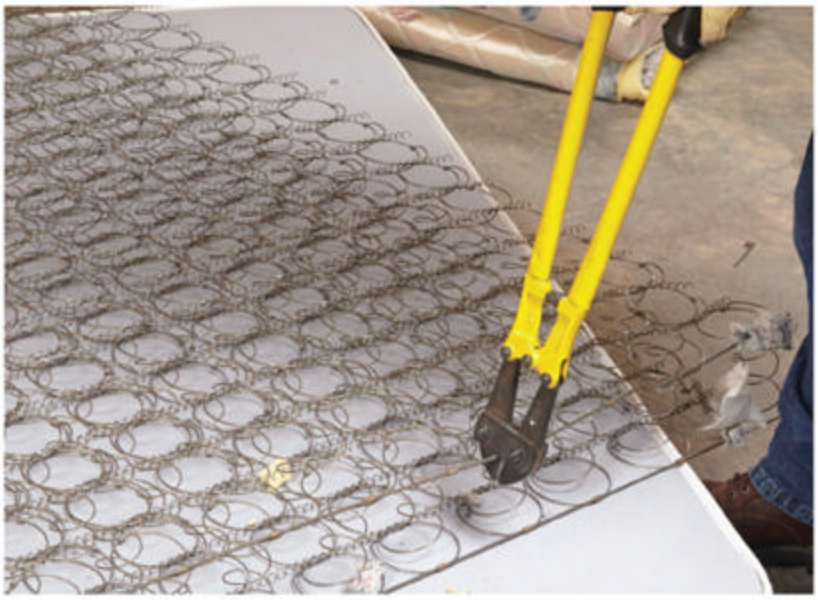
It's true that driveway sealer can't replace the liquid asphalt (oil/tar) that oxidizes and bakes out of the mixture from heat and sun exposure. But a high-quality sealer can dramatically reduce future heat and UV damage. Plus, it seals the pores to prevent aggregate breakup damage caused by water penetration, freeze/thaw cycles and chemicals. So it really does extend the life of your driveway.

8 SPREAD THE SEALER
Start at one leg of the upside-down "U" and apply even pressure to spread the puddle across the driveway and down along the opposite leg. Then pick up the excess sealer on the down leg and start the next row.

SAVE $20 BY CUTTING YOUR MATTRESS DOWN TO SIZE

Many mattress stores recycle your old mattress for free when you buy a new one. But what if you just want to get rid of an old one without replacing it? Garbage haulers charge about $15 per piece and require a special pickup. But a mattress is just fabric, springs and wood. You can chop up the mattress and box spring in less than an hour with just a utility knife, saw and bolt cutter.

Start by removing the fabric. Just cut around the edge and peel off the layers of material and foam. Then cut the perimeter wire using a bolt cutter (**Photo 1**). Cut the springs into manageable pieces (**Photo 2**) and toss them along with the fabric, foam and wood pieces into the trash.



1 CUT AROUND THE EDGES
Snip the border wire every few feet with the bolt cutters. Flip the spring over and repeat on the other side. Wear eye protection.

2 CUT UP THE SPRINGS
Cut the springs into smaller sections and feed them to your refuse hauler in batches.

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Top Ten TIPS

BY RICK MUSCOPLAT editors@thefamilyhandyman.com

ART DIRECTION ELLEN THOMSON • PHOTOGRAPHY TOM FENENGA

Pressure washer smarts

Once you've used a pressure washer, you'll wonder how you ever got along without one. In fact, you'll find new uses for it every time you fire it up! We talked to a few power washer fanatics and several manufacturers to learn the best tips for using and maintaining a pressure washer. And we learned how to avoid the most common mistakes DIYers make, like leaving water in the pump through winter, using the wrong nozzle for the job, and letting the engine idle for more than a few minutes.

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1 Make your pump last longer

Leaving water in the pump can result in mineral buildup and corrosion, which wear out the pump seals and pistons (a $200 repair). So it pays to flush the pump after every use—a quick job. Pick up a can of pump lube/antifreeze solution (such as Briggs & Stratton 6151 Pressure Washer Pump Saver; $10 at home centers). Screw the garden hose adapter onto the pump inlet and press the trigger until you see foamy liquid shoot out the other port. That means the pump is fully lubed and protected against freeze damage.

FLUSH AFTER EVERY USE Attach the lubricant can to the garden hose port. Press the trigger for about two seconds, until water and lube shoot out the other port.

2 Prep the engine for winter storage

The small engines on consumer pressure washers have a limited life span (sometimes less than 200 hours). But you can extend the life of the engine by following these simple pre-storage tips.

- Even if you have only a few hours' use on the crankcase oil, drain the oil and refill with fresh oil (follow the manufacturer's recommendation for viscosity and type). Then run the engine for a few minutes to coat all the internal parts with clean oil and fresh anti-corrosion additives. That will provide the best protection during storage, and you'll be ready to rock and roll at the start of the next season.
- Whether you run the engine dry or fill the tank to the brim, always run the engine with fresh gas treated with fresh fuel stabilizer first. Run the engine for a few minutes so the treated gas fills the carburetor. Then drain the tank and run it dry. Or fill the tank to the brim.
- As we covered in Tip 1, be sure to flush out the pump before putting it away for the winter. If you leave the pump full of water and you live in a freezing climate, your pump will be destroyed.

3 Buy an extra hose to save time

Most consumer pressure washers come with a 25-ft. hose. That means you have to lug the machine up stairs to wash your deck or constantly shut down the engine so you can move the machine as you work. Phooey on that! Just add a 50-ft. extension hose to your 25-ft. and leave the pressure washer in one spot. (You can buy a 50-ft. extension hose for $50 and a hose-to-hose coupler, No. ND10040P, for $5 at northerntool.com or any home center.) The extra hose will cause a slight pressure and volume drop, but you'll still have enough power to clean most surfaces.

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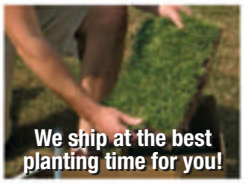

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4 Lube the hose connectors with silicone

Dry O-rings in the hose connector can twist slightly and tear as you make the connection, causing them to fail. Since regular oil washes off when it gets wet, buy a small container of silicone plumber's grease instead. It doesn't wash off and it's compatible with all types of O-ring materials. Tape the container to your machine so you'll always have it handy. Then apply a new coating every five uses or anytime the O-rings look dry.

5 Use only cleaning fluids designed for pressure washers

Pressure washer soap dispensers are designed for dedicated pressure washer fluids only. General-purpose degreasers, heavy-duty cleaning liquids, bleach and acids can destroy the pump. Even if the soap is rated for pressure washer use, make sure it's the right soap for the job—the soaps aren't interchangeable. Vehicle wash soap, for example, won't clean concrete, and the chemicals in concrete soap can discolor alloy wheels and bright metal trim pieces if used to wash your car or truck. For the best results, let the soap set for the recommended time and scrub heavily soiled surfaces with a brush before you rinse.

Finally, never leave soap in the dispenser when you store the machine—it can dry into crystals and cause pump damage. Flush the soap dispenser after each use and pull the gun trigger to run clear water through the pump before you shut it down.

6 Use the right nozzle for the right job

Nozzle tips are color coded to denote their spray pattern (see chart). A zero-degree nozzle provides the most power for really stubborn stains. But that force can etch concrete and brick, blast holes in wood siding, break windows and even rip trim off your car. So test the area first and back the tip away from the surface if you notice any etching or damage.

The soap nozzle (which is black) has a large opening to allow maximum water flow through the pump. The high water flow is needed to siphon soap out of the dispenser nozzle. The soaping function won't work with any other nozzle.

Red 0°

A zero-degree nozzle produces a pencil-point spray with no fan. Use it to blast mud or debris off surfaces from a distance or remove weeds from cracks in concrete.

Yellow 15°

A 15-degree nozzle produces a slight fan pattern. Hold the nozzle at a 45-degree angle to use it like a scraper when you're removing peeling paint or dislodging other coatings.

Green 25°

A 25-degree nozzle produces a wider fan pattern that's perfect for removing dirt and grime. This nozzle can also be used as a water broom to sweep debris off a driveway.

White 40°

A 40-degree nozzle produces the widest fan pattern. Use it to wash delicate surfaces like deck boards, glass and vehicle exteriors.

7 Pull the trigger first

Before you yank the starter rope, pull the gun trigger (or have someone else do it). This will relieve pump pressure and lower engine resistance, making it easier to start (gasoline pressure washers only).

8 Tarp the area before you remove paint

Lay down tarps before using your pressure washer to remove peeling paint. When you're done, just grab the corners and pour the chips into a container for disposal or recycling.

9 Three ways to keep from wrecking stuff

Don't park the unit too close to structures. Hot exhaust can melt vinyl siding and start fires. This damage was caused in less than two minutes.

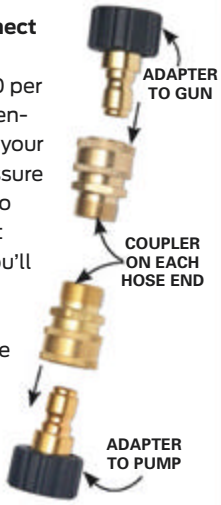
- Never run a gas-powered pressure washer in the garage while you clean the garage floor. Move it well away from the house (at least 5 ft.) to prevent carbon monoxide poisoning.
- Never use a strong spray to remove caulk around windows. The stream can force water behind siding, causing extensive water damage.

10 Buy these accessories to get the most out of your pressure washer

■ **Replacement O-ring kit** with filtering screens ($6 at home centers).

■ **Gutter cleaner attachment** ($30 at home centers). Snap this attachment onto a telescoping extension wand (such as the General Pump 6-ft. to 24-ft. Telescoping Wand; $150 at northerntool.com). You'll be able to blast the gunk out of your gutters without climbing a ladder.

■ **Quick-connect adapters and couplers** ($30 per set at home centers). Convert your screw-on pressure washer hose to quick-connect fittings and you'll never have to worry about O-ring damage or cross-threading.



■ **6-in-1 dial nozzle** ($30 at home centers). Stop fiddling around with individual nozzles. If your hose uses quick-connect nozzles, just snap this on and you're done.

■ **Adjustable pressure regulator** (Simpson Dial-N-Wash Pressure Regulator; $35 at home centers). Snap it onto your hose and connect the other end to your gun. Then adjust the pressure from max down to 1,000 psi to prevent damaging delicate items.

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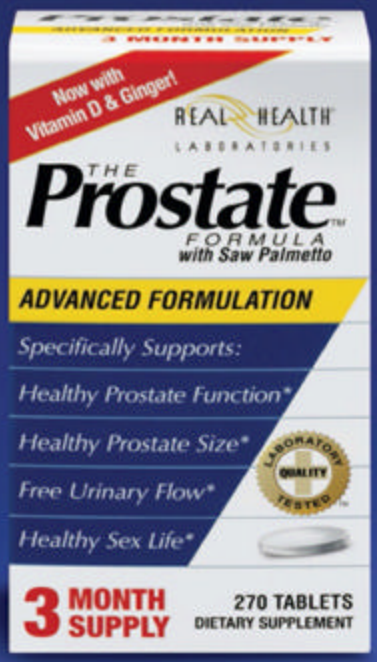

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BY RICK MUSCOPLAT editors@thefamilyhandyman.com

Replace a worn motorcycle chain and sprockets

The key to long sprocket and chain life is to keep your motorcycle chain clean, well lubricated and properly adjusted. But even with meticulous maintenance, the chain eventually wears, and that causes the two sprockets to wear as well. And once one sprocket shows wear, it's best to replace the chain and both sprockets at the same time.

You can do the job yourself in just a few hours and save about $200 in shop labor and parts markup. You may have to invest about $30 in a chain breaker tool and a large socket to loosen the drive sprocket, but you can do the rest of the job with just hand tools, a breaker bar and regular sockets.

We asked Ryan Scott, the owner of Blue Cat Motors, to walk us through the entire process with a Yamaha 350. The procedure on your bike may vary slightly, but the basics are the same.

MEET THE PRO

Ryan Scott is the owner of Blue Cat Motors in St. Paul, MN. Ryan has been hooked on motorcycles since he got his first bike at 15.

Start at the drive sprocket nut

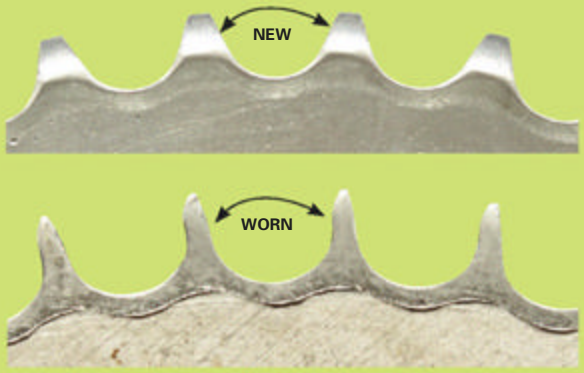
Remove the transmission cover to gain access to the drive sprocket and nut. The nut is often held in place with metal tabs, so bend the tabs down before trying to loosen the nut. Then, with the rear wheel on the ground, loosen the nut with a breaker bar and socket (**Photo 1**).

Next, raise and support the bike using the bike's built-in stand, blocks and jack stands, or a motorcycle jack (**Photo 2**). A motorcycle jack is safest because it provides the best side-to-side stability. (The jack shown, No. 61632, is available for $150 at harborfreight.com.)

Remove and replace the components

Relieve the chain tension by loosening the chain adjusting bolt and the rear axle nut. Then push the rear wheel forward and remove the chain (**Photo 3**).

If the chain has a master link, remove the clip with a pair of pliers and disassemble the chain (**Photo 4**). If your chain doesn't have a master link, you'll need a chain-breaking tool (such as the Heavy Duty Chain Breaker, No. 66488; $17 at harborfreight.com). Mount the tool and break the chain (**Photo 5**). Then discard the old chain.

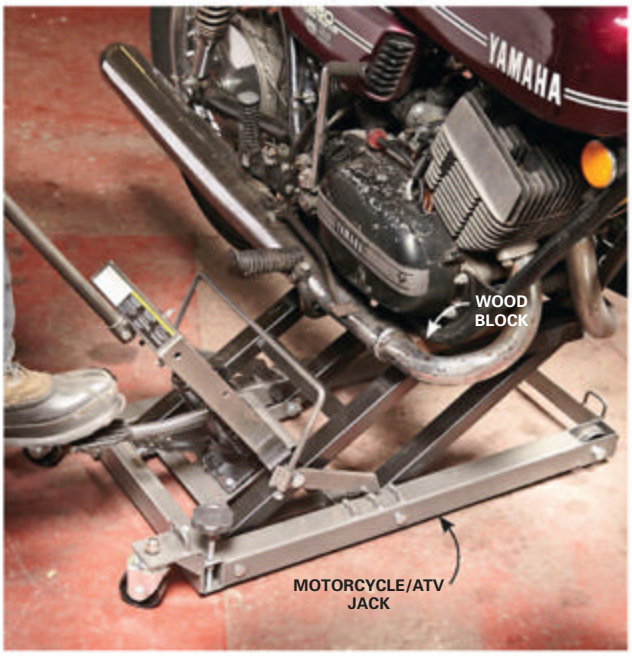


HOW DO YOU KNOW WHEN TO REPLACE COMPONENTS?

Chains stretch as they wear, and all bikes include an adjustment mechanism to take up the slack. Once you reach the maximum adjustment point, it's time to replace the chain.

To check for sprocket wear, examine the top portion of each tooth and the valley between the sprocket teeth. The top of each tooth should be flat, and the valley should be U-shaped and symmetrical. On a worn sprocket, the top of the tooth wears to a sharp point and the valley becomes elongated on the thrust side. If you notice edge wear at the top of the tooth or elongation, it's time to replace the sprockets.

1 LOOSEN THE SPROCKET NUT
Snap a deep socket onto a 1/2-in.-drive breaker bar and loosen the drive sprocket nut. If the rear wheel turns, have a friend sit on the bike to provide resistance.



2 RAISE THE BIKE
Roll a motorcycle jack under the bike and locate the jack pads so they contact the engine and transmission, not the exhaust pipes. If the pipes are in the way, place short wood blocks on the pads to increase clearance. Then jack up the bike.

ART DIRECTION **VERN JOHNSON** • PHOTOGRAPHY **TOM FENENGA** • ILLUSTRATION **FRANK ROHRBACH III**

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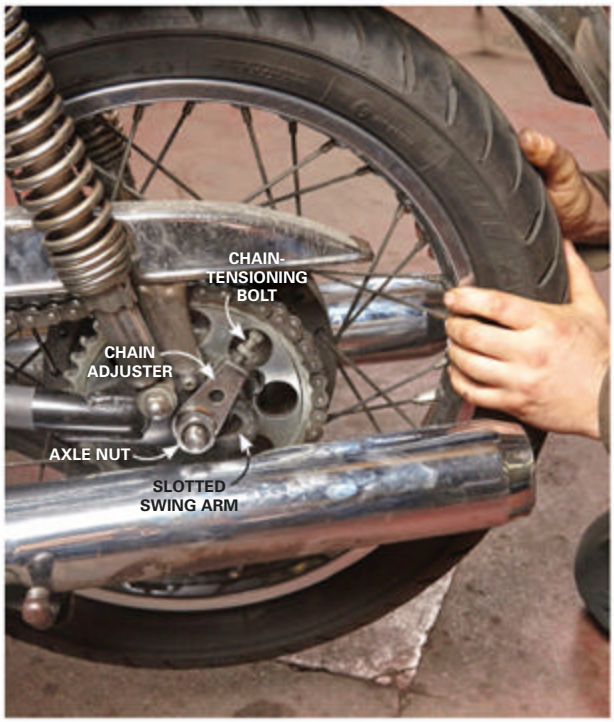

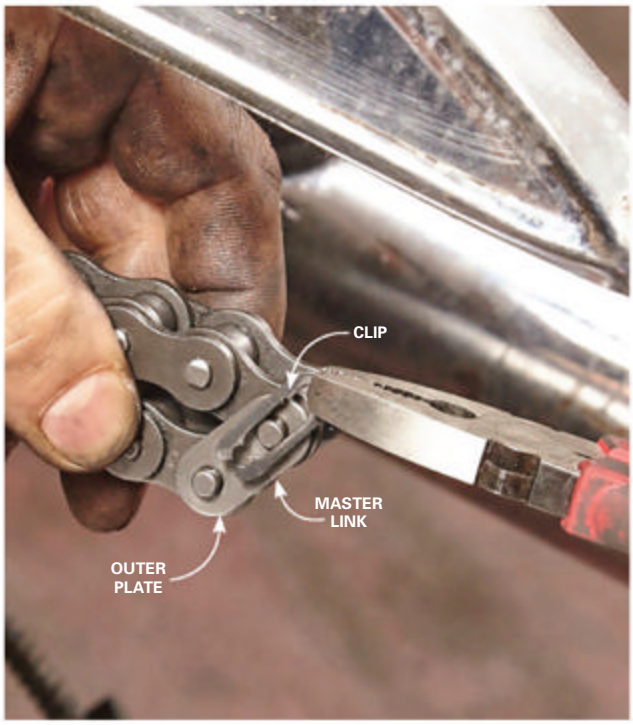

3 RELIEVE CHAIN TENSION
Put a socket or wrench on the axle nut and loosen it. Then unscrew the chain-tensioning bolt, raise the adjuster and push the rear wheel completely forward in the slotted swing arm.

4 DISASSEMBLE THE MASTER LINK
Locate the clip opening and force it over the pin. Then remove the clip and the outer plate and push the pins out of the link.

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5 BREAK THE CHAIN
Select an extractor pin to match the pin size of your chain and screw it into the body bolt. Secure the breaking tool directly over a chain pin and tighten the body bolt. Force the chain pin out of the link and through the anvil hole by tightening the extractor pin.

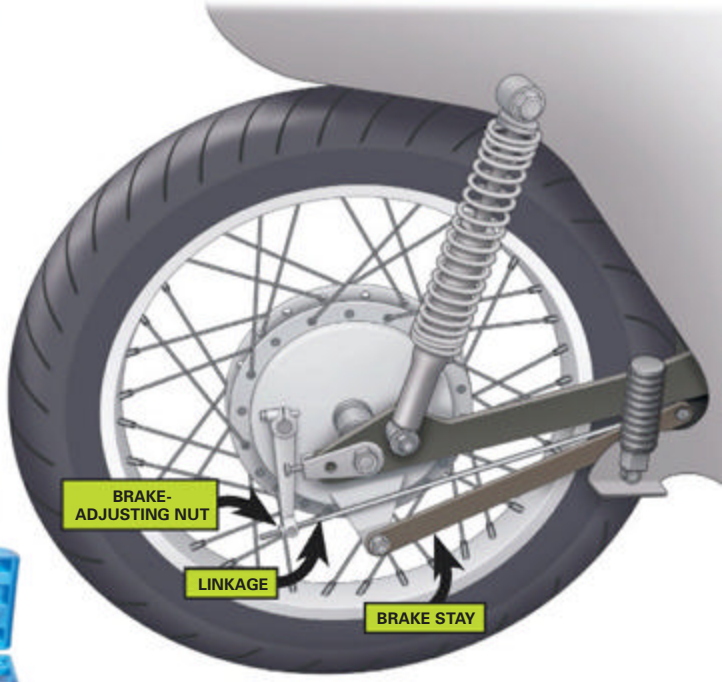

FIGURE A
DISCONNECT THE DRUM BRAKE
Loosen the brake-adjusting nut and remove the mechanical linkage from the drum brake. Then unbolt the brake "stay."

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6 REPLACE THE SPROCKET(S)
Bend the retaining tabs down and remove the sprocket bolts. Then swap in the new sprocket and tighten the bolts using a torque wrench. Bend the tabs up and against the bolt flats.

Next, disconnect the rear drum brake linkage and the stay (**Figure A**). If your bike has disc brakes, remove the caliper.

Slide the rear axle out and remove the rear wheel and brake assembly. Place the wheel on a workbench and replace the rear sprocket (**Photo 6**). Then replace the drive sprocket on the transmission.

Reassemble and adjust the chain

Install the rear wheel, axle and brake assembly on the bike. Push the rear wheel all the way forward in the swing arm. Snug the axle nut slightly to hold it in that position. Then roll the new chain around the drive sprocket and onto the rear sprocket with the open link located near the top of the rear sprocket. Install the master link (**Photo 7**).

Next, tighten the chain-adjusting bolts to obtain 1-in. up/down play on the bottom portion of the chain. Err on the side of too loose rather than too tight (a tight chain causes rapid wear). Then true up the rear wheel (**Photo 8**). Tighten the axle nut to spec using a torque wrench and insert the cotter key (where applicable).

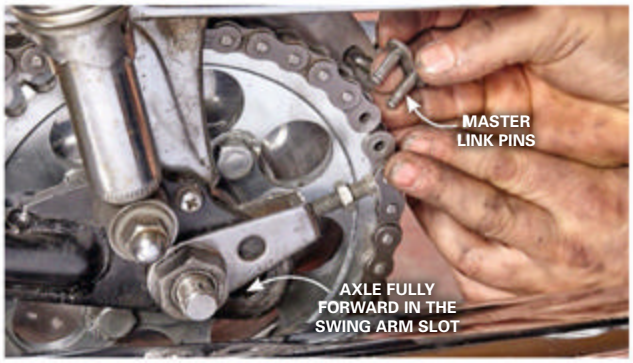
Torque the drive sprocket nut to spec (rear wheel on the ground) and bend the tabs against the flats of the nut. Reinstall the transmission covers.

Lube and go

Lubricate the chain with spray chain lube and rotate the wheel several times to work it into the links. Then drive the bike slowly to fling off the excess before you hit the gas.

EWARE OF LOW-COST PARTS

As in other industries, the motorcycle parts market is flooded with substandard imitations and counterfeit name brand parts that don't come close to the original manufacturers' specifications. That's why it's best to buy parts from an authorized dealer or a trusted repair shop. If you shop online, check out the seller's reviews first. An exceptionally low price on a name brand part is a red flag that the part may be a fake.



7 INSTALL THE MASTER LINK
Slide the master link pins into the chain ends. Then install the outer plate and clip.

8 ALIGN THE REAR WHEEL
Using the adjusting bolts, move the rear wheel in or out until the adjuster marks point to the same number of notches on both swing arms. That aligns the rear wheel sprocket to the front sprocket so it isn't cocked. Rotate the wheel several times to fully seat the chain and check alignment and tension again. Adjust if necessary. Then tighten the locking nut.

PRO tips

BY MARK PETERSEN editors@thefamilyhandyman.com

Coaxial cable

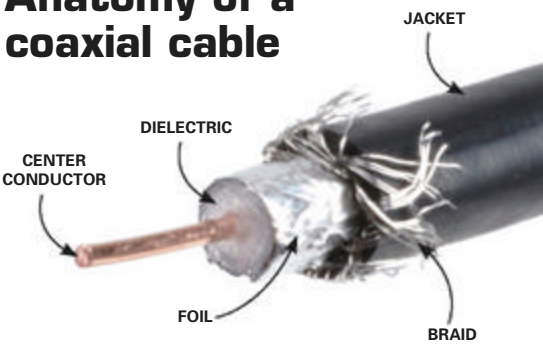
ART DIRECTION ELLEN THOMSON • PHOTOGRAPHY TOM FENENGA • CONSULTANT JOHN WILLIAMSON, MASTER ELECTRICIAN

MEET THE EXPERT

Rune Eriksen has pulled miles of coax cable at the VA Medical Center in Minneapolis, where he worked as an electrician for 31 years.

In today's information age, a massive amount of information is being pushed through our coaxial cables, way more than ever before. That higher volume leaves very little room for error. It only takes one kink in the cable or one faulty connector to bring the whole system crashing down. Our cable guru gave us the lowdown on which products work best and showed us great, practical tips for basic coax installation. So whether you're running cable to a new room, making a simple repair or upgrading a whole house, we're sure there's valuable information here to help with your next coax project.

Anatomy of a coaxial cable



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Use the proper cable

It's important to install the proper cable. RG-6 ("RG" is an old military term for Radio Guide/Grade) is the industry standard, but there are other considerations. The table below should help you decide which would work best for you.

CABLE TYPE	CHARACTERISTICS	COMMON APPLICATIONS
RG-59	Least expensive, thinner conductor, smaller dielectric, thinner foil and braided shield	Security cameras, TV and radio antennas
RG-6 Black	Thicker conductor, larger dielectric, better foil and braid	Industry standard for cable, satellite and Internet
RG-6 Quad-shielded	Two layers of foil and two layers of braiding make for better protection against outside interference	Homes that are near airports, fire stations, police departments, or television and radio stations
RG-6 White	Same as standard RG-6 except white	Appears less conspicuous on houses or trim
RG-6 with ground	Same as standard RG-6 but combined with ground wire	For grounding satellite dishes and rooftop antennas

Roll out the cable

If you lay a spool of cable on its side and start pulling cable off it, the cable will twist as it unravels, and a twisted cable kinks when you pull on it. Our expert slides a section of conduit through the center of the spool and rests it on a ladder. He secures the conduit with a scrap piece of wire.

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Avoid sharp bends

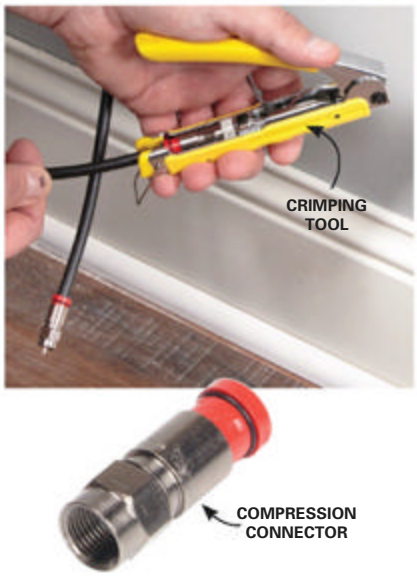
Sharp bends will damage a cable. Think of wrapping a cable around a coffee can; coaxial cable should never be bent sharper than that. Use a 90-degree adapter when a sharp bend is unavoidable, like behind a TV stand. Just make sure the connector is rated to handle Hi-Def if that's the signal you're working with.

AVOID STINGERS

Once the cable has been stripped, leave the foil in place, but peel back the braid. Make certain that not even one of the tiny wires of the braid touches the center conductor. That's what the pros call a "stinger," and stingers are notorious for wreaking havoc with signal quality.

Use a stripping tool

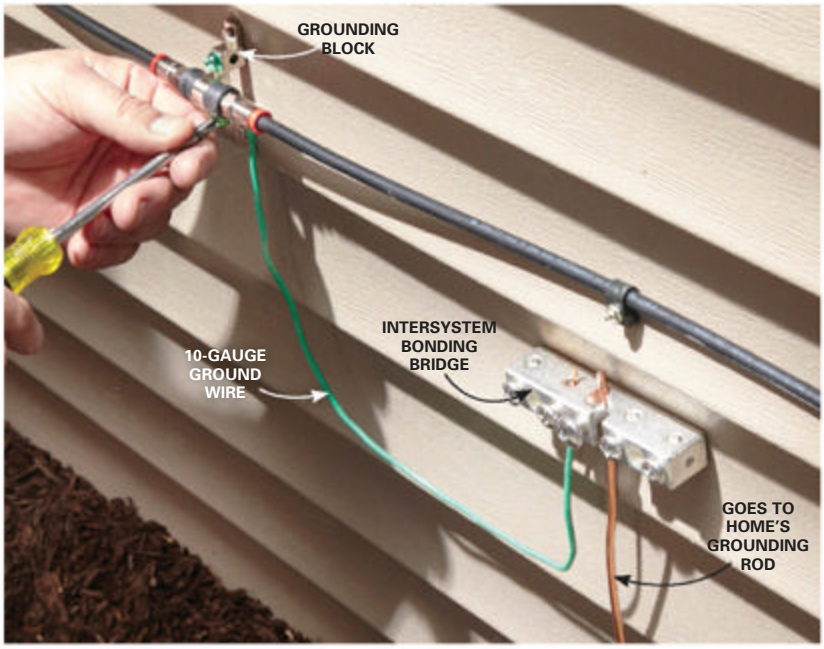
It's not impossible to strip a coax cable with a utility knife, but it's not easy. A $15 stripping tool gives you fast and perfect results every time. Coax strippers have two blades: One blade cuts through the jacket without damaging the braid, and the other blade cuts through everything except the center conductor. Our expert prefers to leave the center conductor a bit long and trim it down (about 1/8 in. past the connector) after the connector is crimped on.



Use compression connectors

Avoid push-on, screw-on and crimp-on connectors; compression connectors work best. You'll need a $15 crimping tool to install compression connectors.

Buy connectors that can handle the highest frequency available. Some cheap connectors may work for a security camera, but not a Hi-Def TV or Internet signal. The same goes for wall plates. Not all wall plates have built-in connectors capable of handling high-end signals. When in doubt, buy the connector with the highest frequency rating. The rating should be displayed on the packaging.



BOND THE CABLE

Even if your Hi-Def TV is working fine, you might want to check to see that the coax cable is "bonded" to the house's grounding system. Bonding simply means connecting two things to ensure electrical continuity and conductivity. In a home, it's important that the electrical system, communication systems, metal plumbing pipes, metal gas piping and other metallic systems be electrically bonded together.

Electrically bonding various systems together limits the different voltage potential (pressure) and shock hazards that could be present during a lightning strike or other electrical anomaly. A difference in voltage potential can create strong currents that can jump between two different systems through an undesirable path, and that path could be you ... that's a bad thing.

The simplest way to bond your coax to the rest of the house is to run the cables through a grounding block, and then run a wire from the block to the grounding electrode (ground rod) or other qualifying grounding connection point.

If you have no idea where any part of the home's grounding system is, call an electrician. In addition to electrocution, improperly grounded cables could lead to damaged electronics and house fires.

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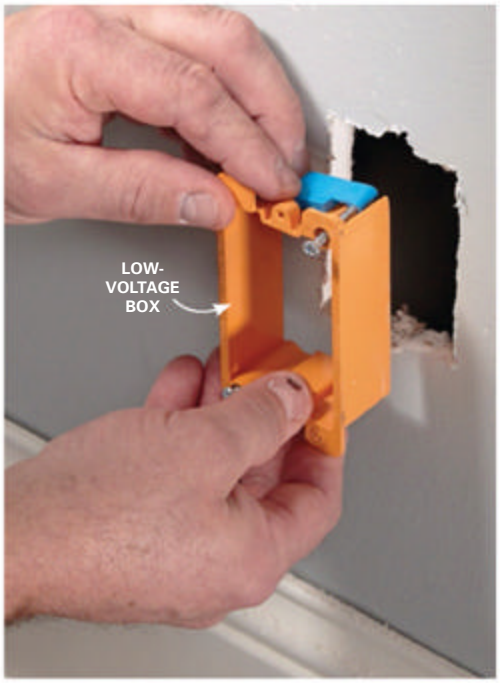
Make a drip loop

Exterior cable should never run sideways or downward and directly into your house. Rainwater will adhere to the cable and follow it right into your home. Loop the cable before it enters the building. The loop will not only help shed the water but also provide extra cable for future work or repairs.

A feed-through bushing will allow you to drill a slightly larger hole so you can fish the cable through the wall without damaging it. Dab silicone caulk behind the bushing before pushing it into its final resting place. Secure cables with clamps or straps that are held in place with screws. Avoid cable straps or hangers that require nails or staples. The chances are good that you'll eventually miss the nail on the strap and whack the cable with your hammer by accident. A cable that's been crushed by a hammer is a cable that will corrupt a signal. Straps with the screws already in place are favored by pros.

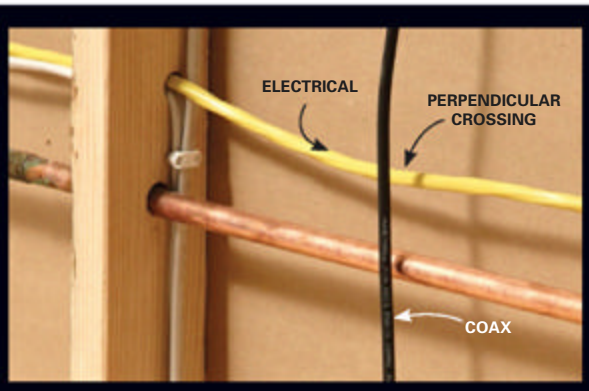


Install a low-voltage box

It's much easier to fish a cable through a low-voltage box (sometimes called a "mud ring") than through a regular electrical box. But that's not the only reason to use them. Low-voltage boxes allow you to push the extra length of wire into the wall cavity without overbending them. You'll damage the cable if you try to cram it into a small electrical box. Leave 8 to 10 in. of extra cable in the wall cavity just in case you want to make changes down the road.

PUSH THE CABLE ALL THE WAY IN

You won't get a good connection if the dielectric portion of the cable isn't pushed flush with the connector. If it's really difficult to do, you may have the wrong connector for the cable you're working with. RG-59, RG-6 and RG-6 Quad all require different connectors.



Run coax 90 degrees to power lines

Keep coax cables away from electrical cables. Electrical cables that run parallel with a coax cable can interfere with your signal. It's OK, however, to run coax cables perpendicular to electrical cables.

Don't damage the cable

Always avoid creasing, kinking, squashing and pinching the cable. A damaged cable will result in a corrupted signal.

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DIY Quiz

BY MARK PETERSEN editors@thefamilyhandyman.com

ART DIRECTION MARCIA ROEPKE • PHOTOGRAPHY HSP

Put on your thinking cap and take this month's quiz to see just how smart you are when it comes to DIY. Here's how it works:

- There are easy, intermediate and really tough questions all mixed together.
- There may be more than one correct answer!
- Find the answers and get your DIY rating on pp. 86 – 87. Good luck!

1. How do you know if your overhead garage door is properly balanced?

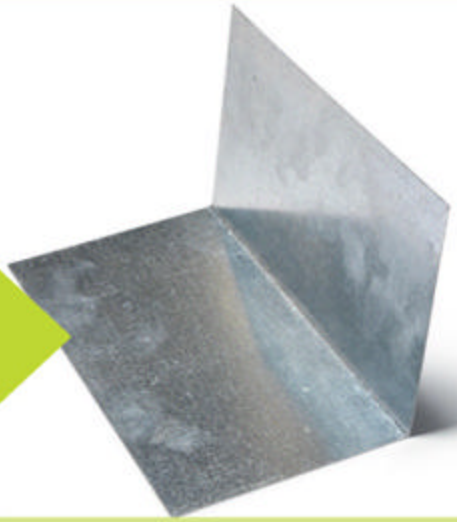
A. The door should stay in place when opened halfway.
B. The door should slowly rise when opened halfway.
C. The door should slowly descend when opened halfway.
D. The door should rapidly descend when opened halfway.

2. What are the three most common widths of carpet rolls available from the factory?

A. 10 ft., 11 ft., 12 ft.
B. 10.5 ft., 11.5 ft., 12.5 ft.
C. 12 ft., 13.5 ft., 15 ft.
D. 11 ft., 13 ft., 15.5 ft.

3. Where would you find this on your house?

A. Outside corner of drywall.
B. In between layers of brick.
C. Over the shingles and behind the siding.
D. On top of the chimney.



4. Which of the following statements about U-factor and R-value are true?

A. Walls and attics are rated with R-value, and windows are rated with U-factor.
B. Higher R-value means less heat loss.
C. Lower U-factor means less heat loss.
D. All of the above.

5. True or False? Length' x Width' x Height' / 9 is the proper formula for ordering concrete by the cubic yard.

6. What is this tool called?
A. Spanner wrench
B. Basin wrench
C. Monkey wrench
D. Drum key wrench

7. True or False? The balusters on a deck railing should be arranged so that a 4-in. sphere cannot pass through them.

8. How does a featherboard assist table saw cuts?
A. It holds material snugly against the fence.
B. It keeps fingers away from the blade.
C. It cleans away debris as you cut.
D. It reduces the chance of a kickback.

9. In homes built before 1978, where does lead paint pose the highest risk to children?
A. Mixed in the soil under the landscaping.
B. In the dust created by moving window sashes.
C. On the siding, soffits and fascia.
D. In the chipping paint on ceilings in the kitchen.

10. What is the purpose of a plumbing trap?

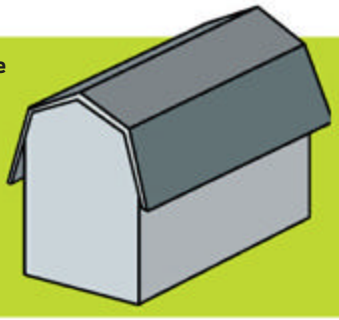
A. Slow water flow to keep it quieter.
B. Keep sewer gases from escaping into the house.
C. Keep clogs and heavier objects accessible for cleanout and retrieval.
D. Keep plumbers in business.

11. True or False? When cutting on a miter saw, more splintering and tear-outs will occur on the back edge of the board (the edge closest to the fence).

12. Which direction should you move a router when working on the outside edge of a board?
A. Toward you
B. Away from you
C. Clockwise
D. Counterclockwise

13. What determines a roof's pitch or slope?
A. The number of inches it rises for every 12 in. it extends horizontally.
B. The number of inches it extends horizontally for every 12 in. it rises.
C. The degree of the hypotenuse angle.
D. The leg of the angle divided by the base.

14. What is this type of roof called?
A. Gambrel
B. Gable
C. Hip
D. Dutch



15. What is one cause of an ice dam?
A. Too many soffit vents
B. Poorly insulated attic
C. Nor'easters
D. A cold roof

Find the DIY Quiz answers on pp. 86 – 87.

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SUPER COUPON!

• 1000 lb. Capacity

MOVER'S DOLLY

HubMaster

LOT NO. 93888/60497 61899/62399

Item 93888 shown

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SAVE 40%

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SAVE UP TO $53

Item 68333 shown

1500 PSI PRESSURE WASHER

LOT NO. 68333/69488

• 1.3 GPM

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LOT NO. 95659 61634/61952

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drillmaster

LOT NO. 44914/61626

SAVE 42% $19.99

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2.5 HP, 10" TILE/ BRICK SAW

CHICAGO ELECTRIC POWER TOOLS

SAVE $185

Item 69275 shown

$214.99 $399.99

LOT NO. 69275/62391

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SUPER COUPON!

AUTOMATIC BATTERY FLOAT CHARGER

CEN-TECH

LOT NO. 42292 69594/69955

SAVE 70%

Item 42292 shown

$5.99

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12,000 LB. ELECTRIC WINCH WITH REMOTE CONTROL AND AUTOMATIC BRAKE

BADLAND

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LOT NO. 68142/61256 60813/61889

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PITTSBURGH

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9' x 72" 2 PIECE STEEL LOADING RAMPS

Haul Master

• 1000 lb. Capacity

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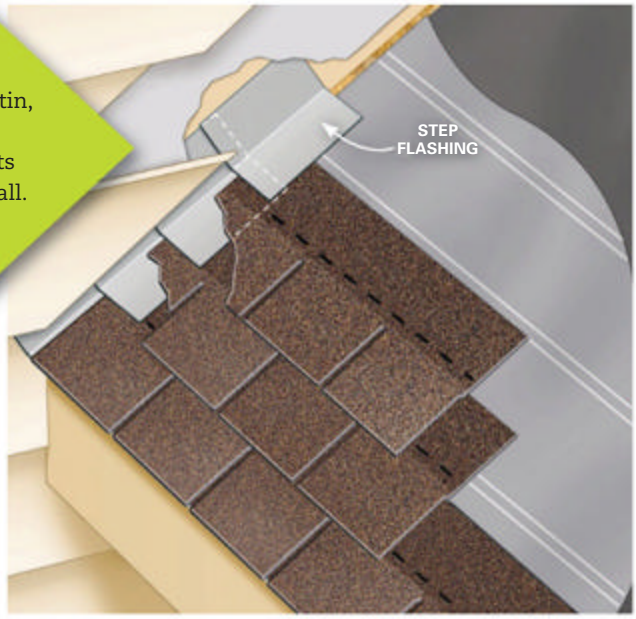
DIY Quiz Answers

1. (**A**) A properly balanced door is less likely to crush someone or something and keeps your door opener from working too hard. With the door closed, disengage the opener from the door by pulling the opener release handle. Then lower the door about halfway. A properly balanced door will hold that position without assistance. If the door rides back up, the springs are under too much tension. If it falls, the tension needs to be increased.

2. (**C**) It's important to know the size of your rooms before shopping for carpet. You don't want to buy carpet that's available only in 12-ft. rolls (the most common size) if most of the rooms in your house are 12-1/2 ft. wide. And it will cost you a bundle more if you order the 15-ft. width for rooms 11 ft. wide. Similar styles can be found in different sizes. If you really love a roll that's much too wide, you may be able to use up the scraps in closets or hallways or on stairs.

3. (**C**) Galvanized step flashing, sometimes called shingle tin, is installed over shingles and behind wall cladding where shingled roofs butt up against a wall. This flashing prevents water from running down between the roofline and the wall.



4. (**D**) U-factor measures how well a building element (windows) transfers heat, so the lower the number the better. R-value measures how well a building element (wall insulation) *resists* the transfer of heat, so the higher the number the better. On a basic level, R-value is the reciprocal of U-factor: U=1/R or R=1/U.

5. False. Length' x Width' x Height' / 27 is the proper formula. Add at least 5 percent extra to account for waste and irregularities in the grade. Some contractors add 1/4 in. to the height measurement, which accomplishes roughly the same thing.

6. (**B**) This weird-looking wrench, sometimes called a sink wrench, is made specifically for removing and installing those hard-to-reach fasteners that clamp older faucet assemblies to the sink. (Newer faucets have plastic wing nuts that can usually be loosened and tightened by hand.) The spring-loaded jaws of a basin wrench pivot so you can either loosen or tighten nuts in tight spaces.

7. True. This applies to any deck more than 30 in. above the ground. The rules are a little different for stairs.

8. (**A & D**) Featherboards have a series of wooden "fingers" that hold wood tightly against the saw fence. The fingers are slightly flexible and cut at an angle, so they allow you to push the wood through while maintaining firm, even pressure. They also dig in and hold wood in place if it starts to kick back.

9. (**B**) Most lead-based paint poisoning in children occurs by exposure to lead dust. Dust containing lead paint is created when window sashes painted with lead paint rub against each other when they're opened and closed. Painted doors rubbing on painted doorjambs is another common problem spot. Test kits are available at home centers and hardware stores. If you have a dust hazard, contact your local health department for remediation guidelines.

10. (**B & C**) Plumbing traps are designed to keep sewer gases from escaping from waste lines, and they also help keep heavier objects (like wedding rings) from traveling too far into the plumbing system. Unused traps, like in floor drains or in unused bathrooms, can dry up and become a source of a sewer gas smells. Pour a little water in the drain if this happens at your house. (If you picked "D," we won't hold it against you.)

11. True. Tear-outs on most saws usually occur where the teeth of the blade exit the wood.

12. (**D**) Move the router in the opposite direction the bit is spinning. This is counterclockwise when working on an outside edge. Move the router clockwise when cutting the inside edge of something like a picture frame.

13. (**A**) One way to find the pitch is by marking 12 in. on a level and then holding the edge of the level against the roof and measuring down. If there's 6 in. between the 12-in. mark on the level and the roof, you have a 6/12 pitch. Use caution when you walk on roofs, especially those with a pitch greater than 6/12. Stay off roofs with a pitch 8/12 or steeper.

14. (**A**) Historically, the gambrel roof was a practical and inexpensive way to add functional space to a second story of a barn. And during colonial times, in some areas of America, even though houses with gambrel roofs had livable space on two stories, they were classified as single-story homes for tax purposes.

15. (**B**) Ice dams start when warm air in the attic causes the snow on the roof to melt. This water runs down the roof and refreezes when it reaches the colder roof edge, forming a dam that causes subsequent water to back up, possibly into your house. Insufficient attic venting is another likely culprit.

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Just days before Hurricane Sandy was to hit New Jersey, I was helping my husband install a "water jet sump pump backup system" in my parents' basement. In the event of a power outage, it works off the water pressure of the house. My husband asked me to hold on to the PVC pipe so he could cut out a piece with his reciprocating saw. While I held it, he made the first cut. When he made the second cut, nasty brown water started gushing out of the pipe and hit me full in the face.

Being the dutiful wife, I held on tight! It took him a few seconds to realize what was happening. He had forgotten to unplug the pump. After pulling the plug, he looked at me with a worried expression, but I began laughing hysterically. I was soaked with that disgusting water from head to toe. At least the project turned out as planned—after Sandy, they had no water in their basement.

Jill Gallery

Ladder shuffle

Last fall, I remodeled an upstairs bathroom. I planned to keep the house clean by accessing the room with a ladder from outside instead of tracking through the house. The ladder rested on the first-floor deck and against a small upstairs deck. Halfway up, I felt the bottom of the ladder start to slip. The faster I scrambled, the faster it gained speed on a light coat of frost that had formed on the lower deck overnight. Just before the ladder crashed to the deck, I bailed off to the side. I suffered a few bruises but no broken bones.

Will Vance

Editor's note: Screw a cleat down on wooden surfaces—and never set up a ladder in frost!

Our iPad edition has twice as many Great Goofs! It's available in the App Store.

Where there's sawdust...

When I was installing cabinets in a small room at our church, I had to start by removing a windowsill. I fired up my circular saw, and after a few minutes, the room was completely clouded with sawdust. Suddenly the smoke alarm went off and automatically alerted the fire station. The church secretary called to explain the situation, but the firefighters came anyway. When they arrived, I had to tell the whole story. My face was redder than their truck! Next time I'll open a window and use an exhaust fan.

Howard Martin

EDITOR **DAVID RADTKE** • ART DIRECTION **MARY SCHWENDER** • ILLUSTRATIONS **STEVE BJÖRKMAN**

Got your own DIY mistake? **GET A $100 GIFT CARD FOR YOUR GREAT GOOF!** See p. 4.

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